



*The University of Sydney*

AUSTRALIAN CENTRE FOR INDUSTRIAL RELATIONS  
RESEARCH AND TEACHING (ACIRRT)

**THE ECONOMICS AND  
LABOUR RELATIONS OF  
AUSTRALIAN WORKPLACES:  
QUANTITATIVE APPROACHES**



**MONOGRAPH No. 10**

# **The Economics and Labour Relations of Australian Workplaces: Quantitative Approaches**

**Proceedings from a Conference  
*held in Sydney*  
19-20 November 1992**

**Organised by ACIRRT, *University of Sydney*  
CEPR, *Australian National University*  
WALMRC, *Curtin University of Technology***

---

**ACIRRT Monograph No. 10**

---

Published December 1993

by

Australian Centre for Industrial Relations Research and Teaching (ACIRRT)  
University of Sydney  
NSW 2006  
Australia

ISBN 0 86758 800 4

# Contents

<b>Contents</b>	(i)
<b>Contributors</b>	(ii)
<b>Acknowledgments</b>	(iii)
<b>Foreword</b>	(iv)
<i>Ron Callus, Peter Dawkins &amp; Steve Dowrick</i>	
<b>1 The Impact of Product Market Competition and Trade Unions on Organisational Change and Workplace Reform</b>	<b>1</b>
<i>Natalia Nunes, Geoffrey Crockett and Peter Dawkins</i>	
<b>2 A Logistic Model of Technological Change Determinants in Australian Workplaces</b>	<b>48</b>
<i>Ray Brooks &amp; Alan Morris</i>	
<b>3 The Determinants of Investment in Training</b>	<b>71</b>
<i>A M Dockery</i>	
<b>4 The Australian Government's Affirmative Action Legislation: Achieving Social Change through Human Resource Management</b>	<b>109</b>
<i>Valerie Braithwaite</i>	
<b>5 Workplace Productivity and Joint Consultation</b>	<b>134</b>
<i>Michael Alexander &amp; Roy Green</i>	
<b>6 Understanding Industrial Action in Australian Workplaces</b>	<b>166</b>
<i>Peter Dawkins &amp; Mark Wooden</i>	
<b>7 Characteristics of Workplaces and Industrial Action Review of the AWIRS Data</b>	<b>195</b>
<i>Lawson K Savery &amp; Geoffrey N Soutar</i>	
<b>8 The Impact of Unions on Workplace Productivity and Profitability in Australian Workplaces</b>	<b>206</b>
<i>Geoffrey Crockett, Peter Dawkins &amp; Charles Mulvey</i>	
<b>9 The Impact of Multiple Unionism on the Enterprise</b>	<b>231</b>
<i>John Benson &amp; Elsa Underhill</i>	
<b>10 Workplace Flexibility: Problems and Prospects for the Australian Trade Union Movement</b>	<b>264</b>
<i>Richard Hall &amp; Bill Harley</i>	
<b>11 Statistics in the Social Sciences: A Missed Blessing</b>	<b>293</b>
<i>Flora Gill</i>	

# Contributors

- Michael Alexander** Employment Studies Centre, Department of Economics,  
*University of Newcastle*
- John Benson** Department of Management and Industrial Relations,  
*University of Melbourne*
- Valerie Braithwaite** Administration, Compliance and Governability Program,  
Research School of Social Sciences,  
*Australian National University*
- Ray Brooks** *Royal Melbourne Institute of Technology*
- Geoffrey Crockett** WA Labour Market Research Centre,  
*Curtin University of Technology*
- Peter Dawkins** Department of Economics and WA Labour Market  
Research Centre, *Curtin University of Technology*
- A M Dockery** *Curtin University of Technology* and DEET
- Flora Gill** Department of Economics, *University of Sydney*
- Roy Green** Employment Studies Centre, Department of Economics,  
*University of Newcastle*
- Richard Hall** Labour and Industry Research Unit - Department of  
Government, *University of Queensland*
- Bill Harley** Labour and Industry Research Unit - Department of  
Government, *University of Queensland*
- Alan Morris** *Victoria University of Technology*
- Natalia Nunes** *Industry Commission*
- Charles Mulvey** *University of Western Australia* and WA Labour Market  
Research Centre, *Curtin University of Technology*
- Lawson K Savery** School of Management & WA Labour Market Research  
Centre, *Curtin University of Technology*
- Geoffrey N Soutar** School of Management & WA Labour Market Research  
Centre, *Curtin University of Technology*
- Elsa Underhill** Department of Applied Economics, *Victoria University  
of Technology*
- Mark Wooden** National Institute of Labour Studies, *Flinders University  
of South Australia*

# Acknowledgments

The conference and this subsequent publication would not have been possible without the generous support of the Federal Department of Industrial Relations. In particular we would like thank David Peetz, Lyn Tacey and Stephen Oxley for their encouragement and assistance.

The conference was organised by the staff at ACIRRT and much of this work fell on Michelle Schumacher. The formatting and finalising of papers for printing was undertaken by Michelle Spatalis and Merilyn Bryce proof read some of the papers in this monograph.

Finally, the conference participants deserve our special thanks. All those that gave papers at the conference put in a great amount of effort in meeting the deadlines and have had to wait a long time to see their efforts in print. The conference also included a number of discussants including, Bruce Chapman, Jim Kitay, Bob Gregory, Russell Lansbury, Steve Frenkel, whose remarks we have not been able to include in this volume but whose contributions helped make the conference a lively and challenging forum.

# Foreword

This monograph contains papers from a conference held at the University of Sydney in November 1992. The conference was organised jointly by Australian Centre for Industrial Relations Research and Teaching (ACIRRT), University of Sydney, the Western Australian Labour Market Research Centre (WALMRC), Curtin University (a consortium of Curtin, Murdoch and The University of Western Australia), and the Centre for Economic Policy Research (CEPR) at the Australian National University.

The purpose of the conference was to bring together researchers who had worked with the Australian Workplace Industrial Relations Survey (AWIRS) data set to discuss their findings and to consider some of the issues that arise in undertaking quantitative analysis.

The AWIRS was undertaken between November 1989 and May 1990 and involved interviews with workplace managers and where present union delegates in over 2,300 Australian workplaces in all industries except Agriculture and Defence. The survey collected information on industrial relations structures, processes and outcomes. In addition, information on the characteristics of organisations was collected, their product market, capacity utilisation and profitability. The papers in this volume are aimed at researchers and practitioners with an interest in topics such as the impact of unions, industrial action, technological change, training, the link between productivity and joint consultation and the impact of affirmative action legislation.

The conference was designed to stimulate debate and an exchange of views on topics of mutual interest to industrial relation and economics researchers. In some cases the two have combined forces to produce a paper, while there are a number of papers on the same theme by researchers with quite different assumptions and approaches to quantitative analysis.

The AWIRS data is very extensive and provides great scope for wide ranging quantitative research. While this conference brought together researchers using a quantitative mode of analysis it is important to note Flora Gill's contribution which warns there are limits to how much can be explained through statistical analysis. The potential contribution of different research methodologies also need to be recognised. It is hoped that at future conferences we may see attempts at combining the best of quantitative and qualitative methodologies. It is also to be hoped that when the Australian Workplace Industrial Relations Survey is repeated the analysis can be extended to changes over time.

Ron Callus, ACIRRT  
Peter Dawkins, WALMRC  
Steve Dowrick, CEPR  
December 1993

# The Impact Of Product Market Competition And Trade Unions On Organisational Change, Technological Change And Workplace Reform

Geoffrey Crockett  
Peter Dawkins  
Natalia Nunes

## INTRODUCTION

In recent years, there has been a growing debate over the performance of the Australian economy. In particular, there has been concern over levels of productivity growth being too low. Productivity advancement may be obtained through the implementation of various kinds of organisational, and technological changes and through other workplace reforms.

One of the leading proponents of the argument that Australia has a serious productivity problem and needs to radically reform its labour market and workplace arrangements to encourage greater innovativeness and productivity growth, is Richard Blandy (see for example, Blandy et. al., 1985; Blandy and Brummitt, 1990; and Blandy, 1988). He argues that one of the factors that is a key to encouraging more dynamic efficiency is the degree of competitive pressure faced by workplaces. This is also consistent with the argument by Michael Porter (1990) in *The Competitive Advantage of Nations*.

There has also been some debate in the literature on the role that unions play in influencing the implementation of efficiency enhancing organisational changes. In the 'two faces of unionism', Freeman and Medoff (1984) suggest that unions may choose to voice their concerns at the workplace and thereby use their power to improve employment conditions and job satisfaction for the employees. Alternatively, unions

may use their power to exploit the workplace, by imposing restrictive work practices, and minimising the effort required by employees. This may restrict the performance of workplaces. Workplaces in which there is good communication with unions and employees are likely to have a lower rate of turnover, since workers may be able to voice their concerns. Such job satisfaction may then give workers the incentive to be more productive.

Apart from product market competition and the influence of unions, there are many factors which may influence the decision of workplaces to implement organisational and technological changes. These include management characteristics and the general industrial relations environment, as well as a range of other workplace characteristics.

The aim of this paper is to examine whether the evidence from the Australian Workplace Industrial Relations Survey (AWIRS) supports two views, firstly that the level and extent of competition in product markets is fundamental to an increased implementation of organisational and technological change, and secondly, whether the presence of unions significantly influences the implementation of workplace reforms.

More specifically, this paper addresses two research questions, namely:

- (i) to test the hypothesis that technological and organisational changes are more likely to occur :
  - in the traded goods sector;
  - in the private sector relative to the public sector; and
  - in more competitive product markets.
  
- (ii) to examine whether trade unions have a positive or negative effect on the implementation of different types of workplace reforms, and organisational and technological changes.

The next section reviews previous studies in these areas. This is followed by a discussion of the methodology used in the empirical models to be fitted to the AWIRS database, together with a description of the variables to be used. After the presentation and discussion of the results from the econometric models, a summary of the conclusions is presented.

## PREVIOUS STUDIES

### Unions and Organisational and Technological Change

Organisational change, the pace and extent of technological change, and the extent of workplace reform can all be expected to influence levels of productivity growth.

There is a great deal of controversy about the direction that the presence of unions exerts on each of these variables. In the case of productivity changes, there are generally two views of the role of unions which Freeman and Medoff (1979) refer to as 'the two faces of unionism'.

The first is the generally held view that trade unions act as monopolies to extract higher wages from their employers, whilst minimising their work effort. In this way, the unions can be seen to have a negative effect on the workplace and productivity by creating a misallocation of resources, further compounded by restrictive practices and industrial action, which encourage inefficiency. Metcalf (1990b) also suggests that unions may also contribute to lower productivity because of the tendency of unionised firms to invest less than non-unionised firms, as well as the generally uncooperative and untrustworthy attitude of unions, which creates an adversarial industrial relations environment.

The alternate view sees unions as having a positive role in the organisation through the exit-voice model, proposed by Freeman and Medoff (1979). The exit-voice model suggests that dissatisfied workers can exit the workplace, and thereby send a message to management that conditions within the workplace are encouraging a high level of turnover. Concerned managers may then have an incentive to investigate what reasons there are for the turnover of employees, and institute reform of work practices or employment conditions.

Alternatively, dissatisfied workers may remain in the organisation and 'voice' their concerns to management in an attempt to overcome the sources of dissatisfaction and to improve the motivation of employees through participative decision making and bargaining. This will reduce the turnover of the firm if workers believe that their concerns will be met, as well as improve workplace relations and the general morale of employees. In addition to this, the 'voice' effects will assist in the generation of improved communication between management and employees, and create pressures for management to adapt inefficient work practices.

Clearly, these two theories lead to different conclusions as to the role of unions in instituting organisational change and productivity advancement. As Metcalf (1990b:230) points out; "the net effect of union presence on labour productivity is therefore clearly an empirical matter".

Several studies have been conducted to identify the precise relationship between the presence of unions and productivity in various enterprises and industries. Belman (1989) conducted a study of various US industries which established that the role of unions in generating productivity differed amongst the industries. Metcalf (1990b) provides a comprehensive set of studies which were conducted in the UK to examine the link between unionism and productivity performance.

Amongst these, Machin (1987) suggested that, for a sample of engineering firms, unions tended to exert a favourable influence in smaller firms, whilst firms ten times larger, demonstrated a negative impact. Wilson (1989) suggested that the most productive enterprises were those where union density was in the range of 50 to 80 per cent. Outside of this range, union density actually had a negative impact upon productivity which infers that there is some optimal level of union membership in organisations. However, results from a study conducted by Pencavel (1977) suggested that increased unionisation from 66 per cent to 80 per cent actually resulted in a reduction of output. These results were also supported in a study by Davies and Caves (1987) which identified a negative effect of union density upon productivity.

Recent evidence using the Australian Workplace Industrial Survey (AWIRS) suggests that the presence of unions has a negative impact on workplace productivity (Crockett, Dawkins, Miller and Mulvey [1992]; Drago and Wooden [1992]). Hence, while the US evidence is mixed, the UK and Australian evidence seems to point towards a negative association.

Organisational change within the firm can reasonably be associated with changes in levels of productivity. It is not clear, however, that all organisational change be productivity enhancing. Machin and Wadwhani (1989) use as the dependent variable in their study of union influence on organisational change, the answer to the British WIRS question on organisational change, defined as

"Substantial changes in work organisation or work practices not involving new plant, machinery or equipment."

They established that unionised plants were more likely to implement organisation changes in the 1980's, and attributed this, and the concomitant productivity increases to the reductions in workplace inefficiencies caused by reducing restrictive work practices, the latter being more prevalent in unionised workplaces. This explanation presupposes a positive link between organisational change and productivity changes.

Also, there is a suggestion in the literature [Machin and Wadwhani (1989)] that workplaces which have a multiplicity of unions may encounter communication problems which may arise out of the necessity of negotiating with such a large number of separate entities. Hence, it may be likely that an increasing number of unions in the workplace have a negative effect on the decision of workplaces to implement organisational and technological changes.

## Level of Competition and Organisational and Technological Change

Blandy (1988) suggests that the level of competitive pressure faced by workplaces is the underlying cause of organisational change, and that increasing the level of competitive pressure faced by Australian workplaces represents the fundamental key to achieving efficiency and productivity gains.

The level of competitive rivalry which is faced in an industry may be determined by a number of factors. Significant barriers to entry may limit the ability of potential competitors to enter the market. This is especially true if incumbent firms have control over supply and distribution networks through vertical integration, or when there are significant costs incurred in establishing operations, both could discourage new firms from entering. Significant regulatory impediments may also restrict the number of competitors which are allowed to operate in the market, such as through Trade Practices legislation.

Hence, incumbent firms may have less of an incentive to undertake efficiency enhancing activities if they face near monopoly conditions, or the threat of potential entrants is minimal. When entry barriers are low, incumbent firms may conduct innovative activities in order to reduce their average costs of production, and thereby make it more difficult for new firms to compete (Caves et al, 1987).

Nevertheless, while monopolistic market structures are unlikely to generate efficiency, or conduct a significant amount of organisational change, because they face no competitive threat to their market share and profitability, perfectly competitive markets, characterised by many small sized firms with an insignificant influence on the market, seldom produce the degree of competitive rivalry which is necessary for dynamic efficiency gains (Blandy et al, 1985).

It is said that the most competitive market structure is one of 'rivalrous oligopoly', which consists of a few firms producing differentiable, but substitutable products who seek to erode the market shares of competitors through improvements in the quality of products or the competitiveness of price (Blandy et al, 1985). Oligopoly market structures necessitate that producers be constantly monitoring the actions of competitors in order to ensure that they do not gain a sustainable competitive advantage, and thereby threaten their position in the market. This requires firms to attain a substantial degree of flexibility in their operations in order to be able to adapt to the actions of competitors, creating gains from dynamic efficiency.

Klein (1977) relates the behaviour of firms in a dynamic economic system to the concept of risk. He suggests that, because firms cannot insure against the risk of losing their market shares, they must be prepared to deal with this competitive risk by predicting competitors' discoveries and creating their own. This fear or risk of losing market share creates a situation in which,

"competitive rivalry - even the latent fear of it - induces producers to search continually for innovation, either productivity-enhancing process innovations that cut costs, or product innovations that secure market niches"

(Blandy et al.,1985:48)

Markets which are characterised by natural monopolies or collusive agreements between competitors are likely to have slower productivity growth, as a result of inefficiency. Therefore, there may be a need to increase the incentives for firms to enter the industry, or at least, to ensure that markets remain 'contestable' so that incumbent firms continue to be innovative, improve the organisation of their workplaces or develop more appropriate management and production techniques (Blandy and Brummitt,1990).

However, a small domestic market may make it feasible for only one, or a few competitors, to operate in the market, thereby reducing the incentive for new firms to enter. It may also increase the incentive for collusive agreements between competitors, thereby creating the inefficiencies of a monopoly. This, along with the fragmentation of state markets appears to have created an effective barrier to entry which has reduced the 'contestability' of many Australian markets (EPAC,1990).

Genuine market competition fulfils three important functions. Firstly, it stimulates the development and use of the most efficient methods of production through innovation. Secondly, it maintains the responsiveness of industrial structures to changes in demand and policy conditions, and lastly, it limits the economic power of firms, and the consequential abuse of the political process, which seek to destroy the very essence of competition (Kasper , 1988) .

The functions of competitive pressure have been expanded upon by Porter (1990) in his book *The Competitive Advantage of Nations*, which stresses the importance of strong rivalry amongst domestic competitors for the development of successful and internationally competitive nations. Hence, vigorous competition at home produces the sources of competitive advantage generated by dynamic efficiency, through continual improvements and innovation. Also, active domestic competition avoids the unfavourable exertion of market power in extracting political favours by firms who may seek an artificial competitive advantage by containing the pressures of genuine competition (Kasper , 1988).

Porter (1990) also suggests that domestic competition creates greater benefits than overseas competition because the pressure exerted by domestic rivals, and their conduct in the market place, is more visible than that of overseas firms. This greater visibility encourages potential competitors to enter markets and compete in what they perceive as being the same environmental conditions. In contrast, the competitive

advantage of overseas firms may be assumed to be the result of different regional or environmental factors, thereby reducing the perceived ability of domestic firms to compete at an equal level.

Success in the home market may condition an enterprise to be able to attain the flexibility and efficiency which is required to compete globally. Hence, the problems of a small domestic market economy may be overcome by expanding a firm's operations overseas and allowing it exposure to the practices and technologies of overseas competitors.

Blandy et al. (1985) acknowledge that the failure of Australian firms to achieve the lowest possible average cost may be due to the focus of firms on satisfying the domestic market only, when they could have been catering to an international market. This would then subject Australian firms to a greater degree of competitive rivalry and enable them to take advantage of greater economies of scale. It would also allow domestic firms to gain greater access to international sources of research and development, and to obtain the benefit of better management and production techniques being used in other countries.

The Industry Commission (1990:10) points out that foreign competition is vital to the success of Australian enterprise efficiency; moreso than for other larger nations such as Japan and the USA, since "their home markets are of sufficient size to support several viable producers without denying them the benefits of scale economies". Hence, acquiring the same competitive stimulus that these nations face domestically, whilst still achieving the efficiency and cost benefits of large scale production, relies upon an open market with very few restrictions to trade.

Australian industries have historically been sheltered by a significant amount of protection and government regulation, which has stifled the degree of competitive rivalry domestically, as well as protected industries from more efficient international competitors. Australian competition policy and legislation is weak and has typically been tolerant of industries with significant levels of concentration and market power, and the persistence of uncompetitive practices (EPAC,1991). This is especially true for regulated industries such as telecommunications and government provided services such as electricity, water, gas and general infrastructure, which face very little, or no effective competition.

The inadequate level of competitive stimulus in product markets was also a pertinent problem in Britain during the 1970's and 80's. A rigorous program of reform, implemented by the Thatcher government was aimed at strengthening the level of competition to encourage the general efficiency of British firms. This was accomplished by removing exchange rate controls, the reduction and abolition of assistance and subsidies to inefficient producers, privatisation of many state corporations and a reduction in the impediments restricting competition from

overseas (Metcalf,1990a). In their study of British workplaces, Machin and Wadwhani (1989) identified that organisational change was more likely if the product market had become less concentrated in the past.

Progress has been made in the development of a more competitive Australian industrial environment. It is generally regarded that,

"with the floating of the Australian dollar and the progressive removal of tariffs and other hidden forms of protection, the competitive environment is changing as never before in Australian enterprises. Managers, employees, unions and the government are feeling pressures to compete and perform that are having a profound effect on their behaviour" (EPAC,1990:9).

### **Other Influences on Organisational and Technological Change**

Machin and Wadwhani (1989) also conclude that organisational change in British firms was more likely to take place in large plants, the result largely of the higher probability of the reduction of previously existing restrictive practices (1989:15). In contrast to this, small firms may be better able to incorporate organisational changes into their processes because of their ability to adapt to changing pressures, and the generally more cooperative industrial relations environment, which facilitates communication and participative decision making.

The age of the workplace may also have a significant impact on the degree of organisational change being conducted. Older firms may have developed inefficiency by operating with outmoded practices, and hence, have a greater opportunity to overcome these inefficiencies through workplace reform.

Australian management has been typically characterised as being inefficient, uncooperative and reluctant to change. Blandy et al (1985:69) believe that "Australian management has been amongst the most conservative in holding to the outmoded 'scientific management' perceptions of their task". Such a lack of enthusiasm has tended to reduce the flexibility and adaptability of Australian enterprises to respond to competitive pressures and external shocks. Evidence suggests that Australian managers are less concerned about instituting growth enhancing changes and improving productivity, than their counterparts in Japan, United States, and United Kingdom (Sentry Holdings, 1981).

Hence, organisational change may be more likely in firms which are characterised by foreign ownership or management, especially if they originate from more dynamic management environments. Machin and Wadwhani (1989:16) found evidence in the British example to support the view that foreign owned firms were positively

associated with organisational change. They suggested that this confirmed the view that British management was inferior, and that "foreign managers were quicker to spot the opportunity to remove restrictive practices". Thus, if Australian management is regarded as more inefficient, or more reluctant to institute changes than British managers, it is likely that the disparity between the organisational change conducted in Australian and foreign owned firms may be even more pronounced.

The level of autonomy may also be a factor limiting the flexibility of firms in responding to competitive pressures. Management may face organisational constraints which reduce the firm's ability to implement changes in order to improve the efficiency of the firm. Machin and Wadwhani (1989) found that 36 per cent of a sub-sample of work managers in the British survey reported themselves as facing some constraints in the organisation of work.

Financial performance is often used as an indicator of the general efficiency of the enterprise. Firms which experience declining profitability may seek to reform existing work practices and implement cost effective processes, in order to remove the inefficiencies of the workplace, and thereby improve financial performance. This is especially true if other firms in the same market are experiencing superior profitability and financial results, if the market is in a recession, or there is declining demand for the organisation's product or service.

Again, Machin and Wadwhani (1989) support this view, that for British firms, organisational change was more likely to take place in organisations where financial performance was below average. These firms had a greater compulsion to institute changes in order to ensure the survival of their operations through increases in the efficiency and flexibility of the firm.

## THE DATA AND VARIABLE DESCRIPTIONS

The Australian Workplace Industrial Relations Survey (AWIRS) was conducted between late October 1989 and May 1990 by the Department of Industrial Relations with two primary objectives;

- "1. to describe the different patterns of workplace industrial relations structures, processes and outcomes; and
2. to collect data that would be useful for secondary analysis of why efficiency and equity outcomes differ at workplaces" (Callus et al, 1990: xviii).

Information was collected in two surveys; a series of face-to-face interviews with the management of 2004 workplaces with a minimum of twenty employees from all

industries, excluding agriculture and defence; and a short telephone questionnaire of managers from 349 workplaces with between five and nineteen employees.

Questions in the survey covered a wide range of issues which attempted to examine the structure and outcome of management- employee relationships at the enterprise level, as well as to identify external influences on the nature of workplace relations and performance.

The Employee Relations and General Management Questionnaire of the survey includes a number of questions which are particularly relevant to the present study. Amongst them were questions which identified the various types of organisational and technological changes being implemented in workplaces; the competitive nature of the market; a number of union variables; workplace and market characteristics and the nature of management relations and autonomy in decision making.

### **Organisational and Technological Change:**

In the AWIRS General Management Questionnaire, respondents were asked whether or not, in the last two years, the workplace had introduced:

1. Major changes in the product or service;
2. Major new plant, equipment or office technology;
3. Major restructuring of how work is done.

In addition to this, the Employee Relations Questionnaire asked respondents whether, in the last five years, the management had implemented;

4. Job redesign;
5. Incentive/bonus schemes;
6. Semi-autonomous work groups (ie. semi-supervising)
7. Quality-circles/team building.

Each of these supply dependent variables was used in separate econometric models. The first two variables are used as indicators of technological change (PRODUCT CHANGE equals 1 if change undertaken and zero otherwise; PROCESS CHANGE equals 1 or zero); the third and fourth variables are used as indicators of organisational changes in the workplace (WORK RESTRUCTURING, JOB REDESIGN equal 1 or zero) ; and the remainder are used as indicators of the kinds of human management related changes taking place in workplaces (INCENTIVE/BONUS SCHEME, SEMI-AUTONOMOUS WORK GROUPS, QUALITY-CIRCLES equal 1 or zero).

**TABLE 1: NUMBER OF WORKPLACES IMPLEMENTING EACH REFORM**

Type of Reform	Number of Workplaces (% of total)
Product Changes	334 (16.7)
Process Changes	737 (36.8)
Work Restructuring	747 (37.3)
Job Redesign	878 (43.8)
Semi-Autonomous Work Groups	300 (15.0)
Incentive/Bonus Schemes	514 (25.6)
Quality Circles	577 (28.8)

Although this provides some very useful information about the changes which may be taking place in workplaces, there is no indication on whether semi-autonomous work groups, quality circles and incentive/bonus schemes existed prior to the two or five year period which the questions specifically referred to. This may create some difficulty in the interpretation of the results, since the most efficient workplaces may have already had these structures in place. Table 1 shows a breakdown of how many workplaces implemented each of the reforms.

In addition to these dependent variables, a variable called 'Reform index' was created to indicate whether particular workplaces had implemented more than one of these seven reforms. By adding the total number of reforms for each workplace together, it is suggested that it is possible to identify workplaces which have a tendency to implement a large number of reforms.

Table 2 shows the number of reforms that each workplace has implemented, as indicated by the Reform Index.

**TABLE 2: NUMBER OF WORKPLACES IMPLEMENTING EACH REFORM INDEX**

Number of Reforms Implemented	Number of Workplaces (% of total)
0	217 (10.8)
1	348 (17.4)
2	342 (17.1)
3	273 (13.6)
4	154 (7.7)
5	79 (3.9)
6	23 (1.1)
7	7 (0.3)

### Nature of Competition

One of the main explanatory variables derived from the AWIRS General Management Questionnaire asks management to rate what they perceive to be the degree of competitive pressure for the workplace's major product or service, on a six point scale ranging from limited to intense. Although it is a somewhat subjective question, it is likely that if management perceive a high degree of competitive pressure, they may have a greater incentive to implement various reforms to work and management practices. Therefore, it is likely that competitive pressure will have a positive relationship with the various dependent variables. Five dummy variables, COMP1 to COMP5 were used as explanatory variables to model this effect, with the lowest level of competitive pressure as the omitted category.

The survey also asks whether the nature of the market for the workplace's major product or service is domestic only without import competition, domestic with import competition, primarily an export market or an administrative office. This was used to create a dummy variable, EXTERNAL COMPETITION equals 1 if domestic with import competition or primarily an export market, and equals zero if domestic only. This is used to test the assertion that firms in the traded goods sector, facing competition from overseas producers, have a greater incentive to achieve maximum efficiency, and hence, be more likely to implement workplace reforms.

The survey also identifies whether workplaces are in the public or private sector. We would expect that, because private sector firms may face greater pressure from competing firms to become more efficient, they may be more likely to reform their workplaces.

## Unions

Data were collected in the AWIRS on whether a union was present, and if so, the number of unions present and the level of union density. Each measure is used to provide some indication on whether the presence of unions exerted a positive influence on the extent and the types of changes taking place in the organisation.

## Other Variables

Several variables were used to control for the effects of a variety of other influences:

### Nature of Management

In line with the previous discussion on the literature, multinationals may have a greater tendency to implement reforms in their workplaces, especially where their head offices are overseas. Two dummy variables were generated: MULTINATIONAL CORPORATION equals one if the firm had overseas branches, and zero otherwise; and AUSTRALIAN HEAD OFFICE equals one if head office in Australia, and zero otherwise.

A further question in the survey asked whether the workplace had experienced a change of management in the last two years. Although a change of management may not necessarily lead to a greater incidence of workplace reform, it is possible that the change of management may have occurred because of the inefficiency or inadequacy of the previous management. For example, the British WIRS Study (Machin and Wadwhani, 1989) found evidence to suggest that workplaces which had been recently taken over were more likely to implement organisational changes, although the evidence was rather weak; the dummy variable CHANGE OF MANAGEMENT equals one if there was a recent change of management, and zero otherwise.

The literature also suggests that firms which have high levels of autonomy in their decision making are also more likely to adopt organisational change; the dummy variable HIGH LEVEL OF AUTONOMY equals one if high level of autonomy in decision making, and zero otherwise.

Finally, the AWIRS asked managers to rate, on a scale of one to six, how they perceive the relationship between management and unions, and management and employees. It is likely that a workplace which operates in a more harmonious and co-operative industrial relations environment may be better able, not only to make the decision on which organisational changes were necessary in the workplace, but also to maximise the efficiency gains possible. Hence, we would expect that management's relations with employees and unions would be positively associated

with the implementation of organisational changes. The two variables MANAGEMENT/UNION RELATIONS and MANAGEMENT/EMPLOYEE RELATIONS were entered as continuous variables with 'one' representing 'poor' relations.

The General Management Questionnaire asked respondents if there were any changes which management would like to make but cannot. Respondents indicated a range of changes that they were constrained from making including management related changes, employee related changes, and changes to staff levels and technology or resources. Clearly, workplaces that face constraints will be less likely to implement reforms and organisational changes. Four dummy variables were used to model these constraints: TECHNOLOGY CONSTRAINT equals one if present, zero otherwise; EMPLOYEE CONSTRAINT equals one if present, zero otherwise; MANAGEMENT CONSTRAINT equals one if present, zero otherwise; STAFF LEVEL CONSTRAINT equals one if present, zero otherwise.

### Workplace Characteristics

As discussed in the review of the literature, it is likely that workplace characteristics such as the size of the workplace, the size of the organisation and the age of the workplace are significantly related to organisational and technological change. The appropriate variables are: WORKPLACE SIZE, ORGANISATION SIZE and WORKPLACE AGE.

There are other variables which may help to identify why some workplaces are more likely to implement the range of organisational changes. Workplaces which are experiencing a change in the demand for their product or service, that is, their demand is expanding or contracting rather than stable, may introduce changes in order to increase their market share in the face of a change in the size of the market. To test this, the dummy variable CHANGE IN DEMAND equals one if demand is either contracting or expanding, and equals zero if demand is stable.

Evidence from the British Study (Machin and Wadwhani, 1989) suggested that plants which were experiencing financial distress were more likely to implement organisational changes. The AWIRS provides data on the rate of return on capital that workplaces attained in the financial year prior to the survey, which may be used as an indicator of the financial performance of the firm. It is likely that firms experiencing a low rate of return on capital would seek to improve their workplaces by implementing efficiency enhancing organisational changes. Since this variable contains 771 missing values out of the total 2004 workplaces in the sample, it was not included in any of the tabulated results. Mention, however, is made of the RATE OF RETURN variable in a specification not actually tabulated.

## Industry dummies

The AWIRS categorises all workplaces into thirteen broad industry groups. To test whether there were significant differences between workplaces in different industries, a series of industry dummy variables was created with manufacturing as the omitted category. This may provide an indication that there are some factors specific to the particular industry that a workplace is in, that may determine whether they implement organisational changes. The industry dummies are as shown in the empirical results; the omitted category is manufacturing.

## ECONOMETRIC MODELS AND SUMMARY OF EXPECTED RESULTS

The econometric analysis relies on two distinct models. Firstly, using LIMDEP (Greene, 1992), a series of binary choice logit models is used to identify the likelihood that workplaces will implement particular reforms from the list of seven listed in Table 1. Secondly, an ordered probit model is used to identify the probability that a workplace will implement more than one of these reforms. This has been done by creating a REFORM INDEX which identifies the number of reforms that a workplace has actually introduced into their workplace ranging from zero reforms to seven. Hence, this ordered probit model indicates the probability that a workplace will be in a high index group, relative to a low index group. For a further insight into the theoretical properties of the ordered probit and logit models, see Maddala (1983).

Following from the literature on the possible factors which may influence the decision of workplaces to implement organisational and technological change, we have some expectations about the likely relationship between the dependent and explanatory variables of the analysis. At the outset we are expecting that each of the reforms will be affected by the explanatory variables in the same way. The expected relationships are presented in Table 3.

## RESULTS

### Introduction

This section presents the results of the various econometric models. Missing values for some of the explanatory variables in each of the models meant that, in some instances, the sample size was reduced to 1443. Since the three union variables, union present, the number of unions and union density, were highly correlated, only one measure was used per model.

**TABLE 3: EXPECTED RELATIONSHIPS**

Dependent variables:

1. Product change
2. Process change
3. Work restructuring
4. Job Redesign
5. Incentive/bonus schemes
6. Semi-autonomous work groups
7. Quality circles
8. Reform index

EXPLANATORY VARIABLES	EXPECTED SIGN
<i>Competition Variables</i>	
Competitive pressure	+
External competition	+
Private sector firm	+
<i>Union variables</i>	
Union present	+ -
Number of unions	-
Union density	+ -
<i>Management</i>	
Multinational company	+
Australian head office	-
Change of management	+
High level of autonomy	+
Management/employee relations	+
Management/union relations	+
<i>Constraints to management</i>	
Employee related constraints	-
Management related constraints-	
Staff level constraints	-
Technology or resource constraints	-
<i>Workplace characteristics</i>	
Workplace size	+ -
Organisation size	-
Workplace age	+ -
<i>Other variables</i>	
Rate of return	-
Changing demand	+

In order to improve the convergence of the data on the Reform Index variable, those workplaces which had implemented six of the total seven reforms were grouped

together with those which had implemented all of the reforms. Together these two index groups accounted for thirty workplaces; grouping them together facilitated the estimation techniques used by the model.

Discussion of the results will be presented in four sections. The first section outlines the results of the technological change models: product changes and process changes. In the second section, work restructuring and job redesign have been used as indicators of the organisational changes. Following that, the results for the human management related changes, namely semi-autonomous work groups, incentive/bonus schemes and quality circles, are presented. In the last section, the results of the Reform Index ordered probit model are discussed. The analysis of the results will concentrate on identifying those variables which are significant at the one, five and ten percent level of significance, and on the signs of the respective coefficients.

### **Results for Technological Changes: Product Changes and Process Changes**

Major changes to the product or service, and major new plant, equipment or office technology were used as indicators of the types of technological changes taking place in workplaces.

#### **Product Changes**

Several attempts were made to obtain results for the econometric analysis of product changes. However convergence was not attained in the twenty five iterations of the model and hence, it is impossible to define any relationships between the implementation of product changes and other workplace characteristics. This problem may have been the result of the small number of workplaces which implemented product changes relative to the other reforms. That is, only 334 workplaces indicated that they had implemented product changes compared to 737 workplaces which implemented process changes (refer to Table 3). This coupled with the missing values for some of the explanatory variables resulted in too few workplaces in the sample from which reasonable predictions could be made.

#### **Process Changes**

Table A1 in the Appendix presents the results of the models which identified the probability with which workplaces implement process changes. The three models use different measures of union presence. The results seem to suggest workplaces that were more likely to implement process changes, had the following characteristic:

- (i) had a larger numbers of unions; (however, the presence of unions at the workplace and an increasing level of union density made the workplace less likely to implement the reform);
- (ii) had experienced a recent change in management;
- (iii) had experienced good management/union relations;
- (iv) were larger sized workplaces;
- (v) were older workplaces;
- (vi) had experienced a change in demand, *ie* demand was either expanding or contracting rather than stable.

One of the competitive pressure group variables was significant, indicating that workplaces which faced the second degree of competitive pressure were more likely to implement the reform relative to the lowest competitive pressure group. However, this was only significant at the 10% level, and hence, the evidence is rather weak. All other competitive pressure groups showed no significant influence.

Information relating to unions seemed to suggest that the presence of unions in the workplace diminished the probability that it would implement process changes. However, workplaces with a greater number of unions were more likely to implement the reform. It is difficult to explain why this may be true.

The results suggest that changes in senior management may lead to a greater incidence of implementation of process changes in the workplace. This is a logical result since a change in senior level management is likely to bring changes to the organisational practices and techniques.

The general industrial relations environment at the workplace also appeared to have a significant influence on the implementation of this reform. Workplaces which had very good management/union relations and management/employee relations were more likely to implement process changes. This may indicate that process changes require negotiation and discussion with unions and employees, such that those workplaces which experience difficulties in communicating between management, unions and employees may be unable to achieve any consensus on the introduction of process changes into the workplace.

Larger workplaces displayed a greater probability of implementing process changes. This may be because larger workplaces are better able to identify and adopt changes in all facets of their operations. Alternatively, this result may suggest that larger workplaces have a greater level of inefficiency within their organisational structures, and thus, perceive they have most to gain from implementing changes.

Similarly, older workplaces were shown to be more likely to implement the process changes. This may be because older workplaces are more likely to have old, outmoded work practices in place, and be using out of date capital equipment and technologies that may have been superseded.

Workplaces which had experienced a change of demand were also more likely to implement process changes. This may be due to the fact that, when demand is contracting for the firm's product or service, workplaces face greater pressure to achieve efficiency gains in order to maintain the same market share. In comparison, workplaces which are experiencing an expanding product demand maximise their market share in the face of buoyant market conditions.

The results of the industry dummy variables tended to suggest that workplaces in the manufacturing industry were more likely to implement process changes than all other industries. This is plausible since workplaces involved in the manufacturing of products are likely to have extremely automated process, and have greater benefits to be attained through the introduction of major new plant, equipment and office technology.

## Organisational Changes

Respondents were asked to indicate whether they had experienced a major restructuring of how work was done in the last two years, whereas the implementation of job redesign referred to the five year period prior to the survey. Although these two time periods differed, there does not appear to be any indication that the results are weakened as a consequence. Together these two variables have been used as indicators of the kinds of organisational changes which have occurred in Australian workplaces. Three models for work restructuring and job redesign are presented in Table A2 in the Appendix using alternate union variables in each equation.

## Work Restructuring

The results of the work restructuring models seem to indicate that there are several variables which are exerting a significant influence upon those workplaces which are implementing this reform:

- (i) Workplaces in the groups facing the most competitive pressure were less likely to implement work restructuring in their workplaces;

- (ii) A change of management increased the probability that a workplace implemented the reform;
- (iii) Workplaces with better relations between management and employees were less likely to implement work restructuring;
- (iv) Workplaces which were part of larger organisations were more likely to implement work restructuring;
- (v) Private sector firms were less likely to implement the reform;
- (vi) Changing market demand conditions were likely to be a characteristic of workplaces implementing the reform.

Firms which faced the most competitive pressure, that is, that belonged to the two most competitive groups, were less likely to implement work restructuring in their workplace, relative to the least competitive workplaces. This tends to refute the argument that increasing competitive pressure in product markets may lead to a greater incentive to conduct reforms in order to increase organisational efficiency. However, this result may be due to a deficiency in the data, which did not identify those workplaces which had already implemented work restructuring prior to the two year period specifically referred to in the questionnaire.

None of the union variables indicated that there was any significant relationship with the implementation of work restructuring.

Workplaces which had experienced a change of senior management personnel in the last two years also had a greater probability of implementing work restructuring. This is as expected, since work structure is likely to be changed when management is changed.

Work restructuring was more likely to occur in workplaces in which the level of management/employee relations was poor. Although this was contrary to what was expected, it seems plausible that management may seek to improve the relationship by restructuring work practices. Alternatively, it may be that the introduction of work restructuring may have been the result of poor relations with employees since the restructuring of work may be contrary to what employees would have preferred.

Workplaces which were part of a larger organisation were again more likely to restructure their work practices, possibly because of the bureaucratic work structures and practices that were in place, as well as the unnecessary repetition of administrative tasks that were required by the workplace for the benefit of the head office.

The results suggest that private sector workplaces were less likely to implement work restructuring. However, the literature appeared to suggest that workplaces in the private sector were more likely to implement various efficiency enhancing reforms when compared to government sector firms, because of the fact that many government firms face no effective competition. This may indicate that the public sector workplaces were in greater need of restructuring than were private sector workplaces.

The model seemed to suggest that workplaces which experienced a change in demand were more likely to implement work restructuring. This is possible because firms which experience changing market demand conditions may seek to improve the efficiency of their workplaces in order to increase their market share in times of expanding market shares, or to maintain market shares in the face of declining product demand.

Finally, workplaces in the manufacturing industry were more likely to implement work restructuring than the wholesale and retail trade industry, but were less likely to implement the reform when compared to the communication and finance, property and business service industries.

### **Job Redesign**

The models for job redesign provided some similar results to those for work restructuring. These results are also provided in Table A2. Overall, the evidence of job redesign suggests that:

- (i) Workplaces that faced increasing competitive pressure were less likely to implement job redesign;
- (ii) Multinational corporations had a higher probability of implementing job redesign;
- (iii) Workplaces which had their head offices in Australia were less likely to incorporate job redesign into their work practices;
- (iv) Workplaces which had experienced a recent change of management had a higher probability of implementing job redesign;
- (v) Workplaces with a high level of autonomy in their decision making were less likely to implement the reform;
- (vi) Larger workplaces were more likely to implement the reform;

(vii) Job redesign was more likely in younger workplaces.

The job redesign models re-affirmed the observation made in the work restructuring models that job redesign was less likely to occur in workplaces which faced increasing competitive pressure. This seems contrary to the literature, that is, that workplaces which faced a greater degree of competitive pressure were more likely to implement various organisational changes.

An interesting result from the model was that multinational corporations were more likely to implement job redesign in their workplaces. In addition to this, those workplaces which had their head offices in Australia were less likely to implement the reform. These results together seem to support the idea that Australian management is more inefficient than overseas management. Multinational corporations may have a greater degree of flexibility in their operations and may have a greater willingness to incorporate changes into their workplaces because of the international scope of their operations, and their exposure to differing management practices. This may be especially true if the head office of the company is overseas, as the major decision making may be conducted by overseas management which is likely to be more efficient and dynamic in their workplaces.

This is an area which could be open to further research to identify whether these reforms are more prevalent in certain nations. For example, much of the literature during the 1980's tended to indicate that Japanese management practices were superior to those employed in various other nations. This would be a valuable study to conduct as it could provide an indication of which nations' management practices we should seek to imitate in order to become more dynamic and efficient. However, this is out of the scope of this paper.

In addition to this, the results seemed to indicate that workplaces which had experienced a change in the senior management personnel in the last two years had a higher probability of implementing job redesign into their workplaces. This is again proof of the assertion that the previous management may have been lax in their approach.

The model also suggests that workplaces which had the benefit of a high level of autonomy were less likely to implement job redesign. This also seems contrary to our expectation that highly autonomous workplaces would be more readily able to make decisions with regard to efficiency enhancing organisational changes.

Again the model seems to indicate that larger workplaces were more likely to implement job redesign. This is a similar result to that which has been indicated for the previous models.

Job redesign had a greater probability of occurring in workplaces which had not been conducting their main activity for very long, that is, they were younger workplaces. This differs from the previous model's results which tended to suggest that older workplaces were more likely to implement process changes. This result is plausible if one considers that workplaces which have not been conducting their main activity, or producing their product, for very long, are still in the experimentation stages of the firm's development. Hence, these younger workplaces may have a greater propensity to alter their job designs and classifications in order to improve the job satisfaction and performance of their employees.

Job redesign had a higher probability of occurring in the communication, mining and finance, property and business service industries when compared to the workplaces in the manufacturing industry. However, workplaces in the construction and wholesale and retail trade were less likely to implement job redesign than manufacturing.

### **Human Management Related Changes**

The remaining reforms were used as indicators of the types of human management related changes that were taking place in Australian workplaces, namely;

Semi-autonomous work groups, incentive/bonus schemes and quality circles. These human management related changes are commonly seen by management as an attempt to increase the productivity of employees as well as to improve the job satisfaction of employees.

### **Semi-Autonomous Work Groups**

Table A3 in the Appendix presents two versions of each of the models for these reforms, using the number of unions and union density in the equations. Union presence did not appear to produce any substantially different results from these two models and hence it has not been included in the results.

Few of the variables in the model used to identify the probability of a workplace implementing semi-autonomous work groups were significant at conventional levels. However, the results did seem to suggest that:

- (i) Workplaces which faced increasing competitive pressure were less likely to implement semi-autonomous work groups, even though the evidence to support this was weak;

- (ii) Workplaces in the traded goods sector, which faced competition from overseas producers, were more likely to implement the reform;
- (iii) Semi-autonomous work groups had a greater probability of occurring in workplaces in which there were better relations between management and unions.

The results of this model for semi-autonomous work groups did not conform to the expectation that workplaces facing greater competitive pressure would be more likely to implement this reform. Workplaces facing a greater degree of competitive pressure, relative to the group which faced limited competitive pressure, appeared less likely to implement the reform.

However, the model did suggest that workplaces which faced external competition in the traded goods sector, were more likely to implement the reform. This may infer that firms which face pressure from overseas producers may be more likely to implement the reform, than those which only face domestic competitive pressure. However, it is difficult to make this comparison between the competitive pressure variable and the external competition variable because there is no indication of whether the competitive pressure variable relates only to the domestic market, or to rates the competition faced from both domestic and external competition.

If the competitive pressure variable related only to domestic competition, then it may be suggested that it is the competitive pressure that a firm faces on the global market that determines the probability that workplaces will implement this particular reform.

Better management/union relations were also a characteristic of the workplaces which had a higher probability of implementing semi-autonomous work groups. This seems plausible since the implementation of this reform relies to a great extent on the competency and willingness of employees to work in this type of environment. If the relations between management and unions are poor, then the ability of union and management to negotiate on the types of tasks and the responsibilities of these work groups will be restricted, and thereby reduce the ability of the workplace to achieve substantial efficiency gains through this reform. Alternatively, this result for the level of management/union relations may suggest that the introduction of semi-autonomous work groups may actually lead to better relations.

Workplaces in the communication, and transport and storage industries were more likely to implement semi-autonomous work groups than workplaces in the manufacturing industry. All of the other industries did not show any significant relationship.

## Incentive/Bonus Schemes

The results of the model for incentive/bonus schemes are also presented in Table A3, and suggest that:

- (i) Firms which faced an increasing degree of competitive pressure had a greater probability of implementing incentive/bonus schemes;
- (ii) Workplaces which faced external competition were more likely to implement incentive/bonus schemes;
- (iii) Incentive/bonus schemes were less likely to occur in workplaces which had their head office situated in Australia;
- (iv) Changes in management increased the probability that a workplace implemented the reform;
- (v) Better management/employee relations increased the probability that a workplace implemented the reform, although the evidence was rather weak;
- (vi) Private sector firms were more likely to implement the reform.

The degree of competitive pressure has a positive effect on the likelihood that a workplace will implement incentive/ bonus schemes. This conforms to the expectation that firms facing competition will attempt to increase the competitiveness and productivity of their firm by offering their employees an opportunity to increase their wages through incentive/bonus schemes. In fact, as the degree of competitive pressure increases in the model, the relationship gains more significance. For instance, for those workplaces in the most intense competitive pressure group, the probability that they will implement the reform is significant at the 1% level.

Firms facing external competition have a higher probability of implementing incentive/bonus schemes than those in the non-traded goods sector. However, this is only significant at the 10% level which may suggest that incentive/bonus schemes are affected more by the degree of competitive pressure faced by the firm, than the fact that they may face competition from overseas.

Workplaces with head offices in Australia again show a greater probability of not implementing the reform, which continues to support the idea that the decision making of Australian management is inferior to that conducted overseas.

Changes to management also increased the probability that the workplace would implement these incentive/bonus schemes. This is likely to have been the result of attempts by the new management to increase the productivity of workers, and thereby improve the efficiency of labour in the workplace. It is likely that such changes in management may have led to an improvement in the relations between management and employees, which was also shown to be a characteristic of workplaces which implemented this reform, although the evidence supporting this was only significant at the 10% level.

Finally, private sector firms showed a greater probability of implementing incentive/bonus schemes. This is rational when one considers that government sector firms often find it difficult to measure the productivity and output of workers, and hence difficult to offer incentive/bonus schemes which reflect the true contribution of employees to the workplace. In addition to this, government sector firms face less competition from others and hence are less likely to feel the need to improve their employees performance.

Workplaces which were in the wholesale and retail trade, communication, finance, property and business services, and recreation, personal and other industries had a greater probability of implementing incentive/bonus schemes than those workplaces which were in the manufacturing industry. This seems especially likely for the wholesale and retail trade, and finance, property and business services industries because that these industries are often commission or sales based. Hence, increasing the efficiency of employees, or their level of sales can be facilitated through the implementation of incentive/bonus schemes.

### Quality Circles

The models estimating the probability that a workplace would implement quality circles indicated that there were a large number of significant variables:

- (i) Firms in the traded goods sector were more likely to implement quality circles;
- (ii) Quality circles were less likely to be implemented in workplaces in which there were a large number of unions, and with a greater level of union density;
- (iii) Multinational corporations had a greater probability of implementing the reform;
- (iv) Workplaces with Australian head offices were less likely to implement quality circles;

- (v) Changes in management also increased the probability that a workplace would implement the reform;
- (vi) Workplaces with a high level of autonomy had a lower probability of implementing quality circles;
- (vii) Better management/union relations in the workplace increased the likelihood that a workplace implemented quality circles;
- (viii) Larger workplaces were more likely to implement the reform;
- (ix) Workplaces that were a part of a larger organisation had a greater probability of implementing quality circles;
- (x) Older workplaces were less likely to implement quality circles in their workplace;

Quality circles appeared to have a greater probability of occurring in workplaces which faced competition from overseas producers. This again reaffirms the idea that firms in the traded goods sector are more likely to implement reforms as a result of the pressure created by efficient overseas producers.

The degree of competitive pressure also has a positive coefficient indicating that firms facing greater competitive pressure are more likely to implement these quality circles, however, the variables are not significant, even at the 10% level.

The union variables used in the quality circles model infer that as the number of unions at a particular workplace increase, there is a lesser probability that the workplace will implement this reform. This negative relationship may give support to the argument that much of the inefficiency of Australian workplaces arises out of the multiplicity of unions at the workplace. Negotiation and conciliation with such a large number of unions at the workplace is difficult, just as the compliance is often difficult to achieve with the large number of awards that are relevant at the workplace. Attempting to co-ordinate activities with many unions would provide a disincentive for those workplaces to attempt to incorporate quality circles in their workplaces.

Furthermore, as the level of union density increases the probability of implementing quality circles also diminishes. This may suggest that powerful unions, that is, those that have a high degree of union density, may be opposing the implementation of quality circles.

The remaining significant variables simply reaffirmed the evidence presented in the previous models with regard to multinational companies and their head offices, changes in management, the level of management/union relations, the effect of the level of autonomy, large workplaces and workplaces which were part of a large organisation, as well as the age of the workplace.

The only industry that showed any significant likelihood that it would implement quality circles relative to the manufacturing industry, was the communication industry. Workplaces in the manufacturing industry were more likely to implement these quality circles than the transport and storage industries, however the evidence to support this was rather weak.

An additional model (not reported) using the rate of return variable indicated that it was a significant variable in this specification. The results appeared to suggest that workplaces which experienced a low rate of return on capital had a greater probability of implementing quality circles. This reaffirms to the result in the British WIRS study (Machin and Wadwhani, 1989) which found that firms in financial distress were more likely to implement organisational changes. This may be due to the fact that firms in financial distress may be under pressure to improve their performance, rather than risk the threat of bankruptcy, and view organisational changes as the means to increasing their efficiency, and thereby improving their financial performance in the future.

For all of these human management related changes, workplaces which faced external competition tended to have a greater probability of implementing the reforms.

### **Reform Index**

The Reform index was created by adding together all of the reforms which each workplace had indicated they had implemented. This created values ranging from 0 to 7; however, to facilitate the estimation techniques of the LIMDEP model, the last two values were grouped together, so workplaces which had implemented six or seven of the total reforms were given a value of six.

In order to preserve the ranking of the values, an ordered probit model was used which estimated the probability that a workplace was in a high reform index group, that is, that it implemented a large number of the reforms.

Three versions of the ordered-probit model, each using alternative union variables, are reported in Table A4. The results suggest that:

- (i) Workplaces which faced external competition had a higher probability of being in a high index group;
- (ii) Workplaces with a greater level of union density had a higher probability of being in a low index group;
- (iii) Multinational companies had a greater probability of being in a high reform index group;
- (iv) Australian head offices had a greater probability of being in a low reform index group;
- (v) Recent changes in a workplace's senior level management gave it a greater probability of being in a high reform index group;
- (vi) Larger workplaces were more likely to implement a large number of reforms;
- (vii) Workplaces which were part of a larger organisation had a greater probability of being in a high reform index group;
- (viii) Workplaces with better management/union relations had a greater likelihood of being in a high reform index group.

In general, the results of this model confirm the overall results of the previous models. It is to be expected that those variables which were common to the independent reform models would be likely to increase the probability that a workplace would be in a high reform index group. This adds strength to the results of the independent models since it appears that there is consistency in the results.

Of the three versions of the Reform Index model, only the level of union density displayed any significant relationship with the number of reforms implemented, whereas the variables denoting the presence of unions and the number of unions in the workplace did not show any significance.

This model, using the union density variable, also indicated that the existence of employee related constraints increased the probability that a workplace would implement a large number of the reforms. This result seems counter-intuitive considering that workplaces which face constraints in their workplace would find it difficult to implement a large number of organisational and technological changes. However, this result was only significant at the 10% level, and was not consistent in the other two versions of the model, so the evidence to support this was rather weak.

The only other unexpected result from this reform index model is the evidence which suggests that workplaces with a high level of autonomy have a greater probability of being in a low index group. It would be expected that workplaces with a high level of autonomy would be more likely to implement a large number of reforms because these workplaces would have more freedom to react to changes in their environment that require these workplace reforms. However, this result has been consistent with the evidence in the independent reform models which also suggests that there exists a negative relationship between workplace being in a high autonomy group and implementation of the reform. This, therefore, tends to disprove our assertions with regard to the level of autonomy.

In addition to this, workplaces in manufacturing had a greater probability of implementing a large number of reforms when compared to the construction and wholesale and retail trade industries. There were other industries which appeared to implement a greater number of reforms than the manufacturing industry, but their relationships were not significant.

It may be of some interest to conduct further research into the actual breakdown of the reforms which were commonly implemented in these reform index groups. For instance, it may be possible that those workplaces which only implemented 1 or 2 of the reforms may have been more likely to implement the identical reform. This would help to provide some indication of the types of reforms that workplaces are likely to perceive as most important for improving efficiency.

## SUMMARY AND CONCLUSIONS

The aim of this paper was to examine whether the evidence from the Australian Workplace Industrial Relations Survey (AWIRS) supports the view that the level and extent of product market competition is the fundamental key to an increase in the implementation of organisational and technological changes. A second aim was to identify the role of other variables relating to competition, and whether unions exerted a positive or negative effect upon the implementation of these reforms.

The main variables relating to competition and workplaces in the traded goods sector were consistently associated with the implementation of each of the reforms. Firms in the private sector were associated with the implementation of a number of reforms, while other reforms appeared to be implemented by firms in the public sector. The effect of the level of competitive pressure differed between the reforms, while the presence of unions in the workplace was positively associated with some of the reforms, but negatively associated with others.

The results of the econometric analysis lead to a number of conclusions. The relationships between the organisational and technological change variables and the main explanatory variables are summarised in Table 4:

(i) Workplaces which face external competition, as a result of being in an export oriented or import competing market, were more likely to implement all of the reforms mentioned. However, the relationship was only significant for semi-autonomous work groups and incentive/bonus schemes. In addition to this, the reform index model indicated that being in the traded goods sector increased the probability that a workplace was in a high reform index group.

This therefore provides strong support for the contention that firms in the traded goods sector have a greater incentive to implement efficiency enhancing organisational changes as a result of the pressure that they face from overseas producers. This may suggest that there are substantial gains to be made from the government's proposal to continue tariff reduction to expose markets to competitive pressure from overseas.

Hence, it may be the competitive pressure that a workplace faces from overseas, rather than domestic competition which determines whether it will implement reforms.

**Table 4: SUMMARY OF THE INFLUENCES OF THE MAIN EXPLANATORY VARIABLES**

Dependent Variable	Traded Goods	Private Sector	Comp. Pressure	Union Present	Number Of Unions	Union Density
Process Change	+	-	-	- **	+ **	- ***
Work Restruct	+	-	- **	+	-	-
Job Redesign	+	-	- **	+	+	-
Semi-Aut. Work Groups	+ *	+	- *	/	-	-
Incentive Schemes	+ ***	+ *	+ *	/	-	-
Quality Circles	+ **	+	+	/	- ***	- **
Reform Index	+ *	-	-	-	-	- *

+ positive co-efficient  
- negative co-efficient  
/ variable not used

\* significant at 1% level  
\*\* significant at 5% level  
\*\*\* significant at 10% level

(ii) Incentive/bonus schemes, quality circles and semi- autonomous work groups were more likely to occur in private sector workplaces although, only the first two reforms were significant. This may be indicative of the types of reforms that are most appropriate to the public sector. The implementation of process changes, work restructuring and job redesign had a greater probability of occurring in government sector workplaces, although the evidence to suggest this was rather weak.

The reform index models suggest that being in the private sector increased the probability of being in a low reform index group. This may have been because public sector workplaces have been in most need of these organisational and technological changes at a time when public policy was encouraging such reform.

(iii) Workplaces which faced a higher degree of competitive pressure were more likely to implement incentive/bonus schemes, but were less likely to implement work restructuring and job redesign. Semi-autonomous work groups were also less likely to occur in workplaces which faced higher levels of competitive pressure, although the evidence to support this was rather weak.

The reason for these differing results between reforms may be that incentive/bonus schemes are seen as an attempt to improve the performance of workplaces which may already be efficient. Hence, the incentive for workplaces to implement these changes may be the result of the level of competitive pressure that is faced in the market. In comparison, reforms such as work restructuring and job redesign may be seen as attempts to eliminate the inefficiencies in workplaces, rather than enhance the performance of an efficient workplace. If these inefficient workplaces faced a low level of competitive pressure, then we would be likely to observe a negative relationship between competitive pressure and workplace reform. This negative result for competitive pressure on the implementation of process changes, work restructuring and job redesign also coincides with the public sector firms having a greater implementation of these reforms. This may explain why firms which faced lower levels of competitive pressure were more likely to implement the reforms, since public sector firms would usually face very little competitive pressure. Hence, these results seem to suggest that attempts to eliminate public sector inefficiencies have resulted in those firms which face very little competitive pressure, reforming their workplaces by implementing process changes, work restructuring and job redesign. Alternatively, private sector firms which may face high levels of competition may be more likely to use incentive/bonus schemes and quality circles.

(iv) Evidence to identify the role of unions in implementing organisational and technological changes was rather weak. The only consistent result between the various reforms indicated that increasing levels of union density within workplaces reduced the probability that the workplace would implement reforms, although it was only significant for the implementation of process changes, quality circles and the reform index. This may suggest that workplaces which have a high level of union density may have powerful unions which are opposing the introduction of changes in the workplace.

The presence of unions in the workplace provides conflicting evidence for the reforms. Work restructuring and job redesign are more likely to occur in workplaces in which there is a union present, although the relationship is not statistically significant. However, there is a significant relationship for process changes which tends to suggest that the presence of a union diminishes the probability that a workplace will implement the reform.

The number of unions also provides conflicting evidence. Process changes and job redesign are more likely to occur in workplaces with a large number of unions, however the latter is not statistically significant. For all of the other reforms, increasing the number of unions at the workplace leads to less reform although the relationship is only statistically significant for quality circles. This negative relationship tends to support the contention that the problems associated with a multiplicity of unions at the workplace reduce the ability of the workplace to

implement organisational and technological changes. However, the evidence to support this is rather weak.

(v) In addition to these variables specifically tested for, there were a number of other variables incorporated into the models in order to test for the effects of control variables. The evidence suggests that the probability that a workplace would implement organisational and technological changes was greater if:

- it was a larger workplace;
- the workplace was part of a larger organisation;
- there had recently been a change at senior level management;
- the workplace was part of a multinational corporation;
- the head office of the workplace was overseas;
- the workplace has good management/union relations.

In conclusion, the analysis supports the hypothesis that workplaces in the traded goods sector are more likely to implement organisational and technological changes. It also indicates that workplaces in the private sector are more likely to implement certain types of reforms, whereas workplaces in the public sector are more likely to implement others. However, this study does not provide conclusive evidence that competitive pressure in product markets increases the probability that a firm will implement each workplace reform mentioned in this study. It appears that greater competitive pressure leads to a higher probability that a firm will implement reforms such as incentive/bonus schemes and quality circles especially in the private sector, while the other reforms appear to have a greater probability of occurring in product markets which face low levels of competitive pressure, such as in the public sector.

## APPENDIX

Table A1: LOGIT MODEL OF PROCESS CHANGES

*Dependent Variable: Workplace Experienced a Recent Process Change*

Explanatory Variables	Process Changes		
	with union present	with number of unions	with union density
Constant	-1.7837 (-3.248)*	-2.1831 (-3.906)*	-1.8279 (-3.165)*
Comp1	0.4882 (1.625)	0.4195 (1.4)	0.5440 (1.701)***
Comp2	-0.1374 (-0.476)	-0.1484 (-0.514)	0.0812 (0.269)
Comp3	-0.1801 (-0.747)	-0.2633 (-1.092)	-0.2350 (-0.899)
Comp4	-0.0730 (-0.345)	-0.1344 (-0.635)	0.00831 (0.037)
Comp5	-0.1626 (-0.817)	-0.2279 (-1.148)	-0.0925 (-0.431)
External Competition	0.0393 (0.277)	0.0446 (0.314)	-0.00835 (-0.055)
Union Present	-0.4974 (-2.451)**	-	-
Number of Unions	-	0.0550 (2.317)**	-
Union Density	-	-	-0.000419 (-1.772)***
Multinational Corporation	0.01021 (0.534)	0.1699 (0.893)	0.1694 (0.819)
Australian Head Office	-0.0414 (-0.194)	-0.1234 (-0.581)	-0.0589 (-0.253)
Change of Management	0.3516 (3.273)*	0.3585 (3.33)*	0.3506 (3.031)*
High level of Autonomy	-0.0199 (-0.175)	0.0596 (0.525)	-0.00470 (-0.038)
Management/ union relations	0.0703 (2.606)*	0.0380 (1.554)	0.0543 (1.877)***
Management/ employee rel.	0.1575 (2.641)*	0.1875 (3.13)*	0.1236 (1.934)***

(continued)→

Workplace size	0.1448 (3.443)*	0.0931 (1.96)***	0.1701 (3.733)*
Organisation size	-0.0331 (-0.047)	-0.0465 (-1.387)	-0.0220 (-0.58)
Workplace Age	0.1290 (2.975)*	0.1129 (2.602)*	0.1131 (2.441)*
Private Sector Firm	-0.2373 (-1.127)	-0.1034 (-0.485)	-0.3209 (-1.383)
Change in Demand	0.3401 (2.901)*	0.3349 (2.862)*	0.4374 (3.443)*
Technology Constraints	0.2529 (1.396)	0.2925 (1.616)	0.3100 (1.534)
Mining	-0.4789 (-1.346)	-0.3903 (-1.096)	-0.3001 (-0.805)
Electric etc	-0.7539 (-2.328)**	-0.7582 (-2.342)**	-0.8185 (-2.399)**
Construction	-1.3151 (-3.906)*	-1.3414 (-3.906)*	-1.5513 (-3.906)*
Wholesale & Retail Trade	-0.4943 (-2.765)*	-0.4057 (-2.275)**	-0.4695 (2.382)**
Transport & Storage	-0.8266 (-2.945)*	-0.8118 (-2.901)*	-0.8090 (-2.684)*
Communication	0.1404 (0.389)	0.2155 (0.596)	0.1277 (0.323)
Finance, Property & Bus.	-0.5173 (-2.485)**	-0.3415 (-1.614)	-0.4947 (-2.209)**
Public Administration	-0.6889 (-2.23)**	-0.6610 (-2.135)**	-0.7553 (-2.324)**
Community Services	-1.1116 (-3.906)*	-1.0931 (-3.906)*	-1.1664 (-3.906)*
Rec, Personal & other	-1.1966 (-3.906)*	-1.1590 (-3.906)*	-1.2434 (-3.733)*
Sample size	1679	1679	1443
% implemented	37.82	37.82	38.87
% correct	62.7	62.8	61.9

- ( ) T-values  
 \* significant at the 1% level  
 \*\* significant at the 5% level  
 \*\*\* significant at the 10% level

**Table A2: LOGIT MODEL OF ORGANISATIONAL CHANGES**

Dependent Variable: (Model 1) Workplace Undertook A Major Restructuring of How Work Was Done in the Last Two Years

Dependent Variable: (Model 2) Workplace Undertook Job Redesign in the Last Five Years

Explanatory Variables	Work Restructuring (Model 1)			Job Redesign (Model 2)		
	with union present	with number unions	with union density	with union present	with number unions	with union density
Constant	0.1169 (0.215)	0.2960 (0.565)	-0.00708 (-0.012)	-0.6558 (-1.228)	-0.4814 (-0.933)	-0.4426 (-0.778)
Comp1	-0.3537 (-1.14)	-0.3212 (-1.037)	-0.0911 (-0.279)	-0.2584 (-0.84)	-0.2322 (-0.757)	-0.1640 (-0.502)
Comp2	-0.1500 (-0.525)	-0.1435 (-0.503)	0.000928 (0.031)	-0.4875 (-1.706)***	-0.4882 (-1.71)***	-0.4865 (-1.597)
Comp3	-0.3402 (-1.418)	-0.2945 (-1.23)	-0.2332 (-0.903)	-0.5194 (-2.187)**	-0.4997 (-2.108)**	-0.4334 (-1.687)***
Comp4	0.4424 (2.087)**	-0.4084 (-1.935)**	-0.2683 (-1.181)	-0.4239 (-2.035)**	-0.4056 (-1.955)***	-0.459 (-2.041)**
Comp5	0.5018 (2.529)**	-0.4673 (-2.372)**	-0.3641 (-1.701)***	-0.6027 (-3.084)*	-0.5778 (-2.975)*	-0.4956 (-2.34)**
External Competition	0.2038 (1.383)	0.2010 (1.365)	0.1504 (0.945)	0.1767 (1.246)	0.1821 (1.285)	0.2890 (1.89)***
Union Present	0.2268 (1.074)	-	-	0.2668 (1.322)	-	-
Number of Unions	-	-0.0307 (-1.296)	-	-	0.0100 (0.427)	-
Union Density	-	-	-0.00188 (-0.799)	-	-	-0.00335 (-1.436)
Multinational Corporation	0.1223 (0.632)	0.0923 (0.48)	0.1598 (0.756)	0.4437 (2.332)**	0.4225 (2.23)**	0.3820 (1.826)***
Australian Head Office	-0.2014 (-0.93)	-0.1632 (-0.762)	-0.1118 (-0.472)	-0.5079 (-2.402)**	-0.4717 (-2.253)**	-0.4065 (-1.752)***
Change of Management	0.4119 (3.906)*	0.4090 (3.906)*	0.3981 (3.443)*	0.3072 (2.91)*	0.3079 (2.918)*	0.3965 (3.492)*
High level of Autonomy	-0.0534 (-0.473)	-0.0720 (-0.635)	-0.0569 (-0.46)	-0.3382 (-3.031)	-0.3442 (-3.084)*	-0.3735 (-3.056)*
Management/ union relations	0.0130 (0.493)*	0.0269 (1.091)*	0.0167 (0.576)***	0.0178 (0.689)	0.0301 (1.253)	0.0467 (1.642)

(continued) →

Explanatory Variables	Work Restructuring (Model 1)			Job Redesign (Model 2)		
	with union present	with number unions	with union density	with union present	with number unions	with union density
Management/employee rel.	-0.1739 (-2.986)	-0.1870 (-3.225)	-0.1413 (-2.233)	0.0910 (1.568)*	0.0849 (1.466)	0.0849 (1.339)
Workplace size	0.0218 (0.516)	0.00672 (0.142)	0.00590 (0.129)	0.2216 (3.906)	0.2133 (3.906)*	0.2214 (3.906)*
Organisation size	0.0759 (2.287)**	0.0826 (2.491)**	0.1127 (3.007)*	0.00499 (0.152)	-0.00205 (-0.062)	0.0276 (0.74)
Workplace Age	-0.0239 (-0.589)	-0.0161 (-0.375)	-0.0402 (-0.874)	-0.0869 (-2.043)**	-0.0855 (-2.003)**	-0.0763 (-1.663)**
Private Sector Firm	-0.2918 (-1.427)	-0.3627 (-1.753)	-0.4050 (-1.793)	-0.1403 (-0.694)	-0.1465 (-0.715)	-0.2798 (-1.243)
Change in Demand	0.2477 (2.119)**	0.2489 (2.128)**	0.2669 (2.11)**	-0.1142 (-1.003)	-0.1106 (-0.972)	-0.1458 (-1.18)
Employee Constraints	0.1650 (0.953)	0.1890 (1.089)	0.1685 (0.893)	-0.0604 (-0.35)	-0.0547 (-0.316)	0.00529 (0.028)
Staff Level Constraints	0.1804 (0.585)	0.1824 (0.5919)	0.4402 (1.31 )	-	-	-
Mining	0.4053 (1.156)	0.3539 (1.013)	0.4626 (1.262)	-0.8638 (-2.251)**	-0.8968 (-2.345)**	-1.0891 (-2.625)*
Electricity etc	0.1363 (0.43)	0.1395 (0.44)	0.0440 (0.132)	0.2032 (0.636)	0.2163 (0.677)	0.2142 (0.636)
Construction	-0.3205 (-1.09)	-0.3048 (-1.039)	-0.4241 (-1.336)	-0.7236 (-2.517)**	-0.7103 (-2.475)**	-0.7237 (-2.353)**
Wholesale & Retail Trade	-0.3981 (-2.07)**	-0.4410 (-2.294)**	-0.5511 (-2.56)**	-0.4267 (-2.361)**	-0.4414 (-2.441)**	-0.6210 (-3.07)*
Transport & Storage	-0.1165 (-0.417)	-0.1214 (-0.434)	-0.0988 (-0.329)	-0.2203 (-0.807)	-0.2082 (-0.763)	-0.1875 (-0.637)
Communication	1.2243 (3.056)*	1.1818 (2.945)*	0.9202 (2.141)**	1.3334 (3.248)*	1.3353 (3.248)*	1.0180 (2.342)**
Finance, Prop & Bus.	0.4336 (2.074)**	0.3452 (1.625)	0.3378 (1.498)	0.4332 (2.112)**	0.4204 (2.02)**	0.3331 (1.503)
Public Admin	-0.2934 (-0.959)	-0.3125 (-1.017)	-0.3305 (-1.024)	0.2603 (0.841)	0.3060 (0.988)	0.2633 (0.806)
Community Services	-0.0606 (-0.258)	-0.0714 (-0.304)	-0.1305 (-0.514)	-0.3102 (-1.357)	-0.2892 (-1.264)	-0.5744 (-2.06)**
Rec, Personal & other	0.0970 (0.358)	0.0740 (0.273)	0.3078 (1.029)	-0.2863 (-1.078)	-0.2729 (-1.027)	-0.2262 (-0.754)

(continued) →

Explanatory Variables	Work Restructuring (Model 1)			Job Redesign (Model 2)		
	with union present	with number unions	with union density	with union present	with number unions	with union density
Sample size	1679	1679	1443	1679	1679	1443
% implemented	39.61	39.61	39.09	45.98	45.98	45.46
% correct	63.5	63.4	62.9	61.4	61.0	61.5

( ) T-values \* sign. 1% \*\* sign. 5% \*\*\* sign. 10%

**Table A3: LOGIT MODEL OF HUMAN MANAGEMENT RELATED CHANGES**

Dependent Variable: (Model 1) Semi-autonomous Workgroups Introduced in the Last Five Years

Dependent Variable: (Model 2) Incentive/Bonus Schemes Introduced in the Last Five Years

Dependent Variable: (Model 3) Quality Circles Introduced in the Last Five Years

Explanatory variables	Semi-Autonomous Work Groups (Model 1)		Incentive/Bonus Schemes (Model 2)		Quality Circles (Model 3)	
	with number unions	with union density	with number unions	with union density	with number unions	with union density
Constant	-2.2175 (-3.147)*	-2.1342 (-2.722)*	-3.4568 (-3.906)*	-3.2571 (-3.906)*	-1.6527 (-3.019)*	-1.3329 (-2.203)*
Comp1	-0.5698 (-1.371)	-0.9378 (-1.902)***	0.1982 (0.531)	0.1761 (0.437)	0.1229 (0.388)	0.1009 (0.295)
Comp2	-0.1237 (-0.343)	-0.0153 (-0.041)	0.5269 (1.581)	0.6264 (1.79)***	0.4691 (1.614)	0.4605 (1.475)
Comp3	-0.5253 (-1.613)	-0.6007 (-1.672)***	0.6409 (2.338)**	0.7840 (2.666)*	0.2036 (0.82)	0.0944 (0.438)
Comp4	-0.8760 (-2.885)*	-0.3969 (-2.653)*	0.7656 (2.208)**	0.7202 (2.092)**	0.1864 (0.355)	0.2240 (0.355)
Comp5	-0.3682 (-1.416)	-0.3969 (-1.379)	0.7656 (3.363)*	0.7202 (2.893)*	0.1864 (0.896)	0.2240 (0.983)
External Compet'on	0.5343 (2.738)*	0.5558 (2.581)*	0.2769 (1.883)***	0.2942 (1.834)***	0.3003 (2.054)**	0.3502 (2.202)**
Number of Unions	-0.0259 (-0.795)	-	-0.0156 (-0.466)	-	-0.0508 (-1.96)***	-
Union Density	-	-0.0003 (-0.098)	-	-0.0055 (-2.081)**	-	-0.0062 (-2.475)**
Multinat. Corp	0.2897 (1.048)	0.0099 (0.033)	0.2152 (1.07)	0.3178 (1.419)	0.5394 (2.702)*	0.4457 (2.029)**
Aust Head Office	-0.1997 (-0.652)	0.1578 (0.468)	-0.4224 (-1.909)***	-0.5251 (-2.134)**	-0.5690 (-2.599)*	-0.5313 (-2.205)**
Change of Management	-0.0044 (-0.031)	-0.0302 (-0.194)	0.2993 (2.312)**	0.3416 (2.248)**	0.2928 (2.61)*	0.3027 (2.469)**
High level Autonomy	-0.2193 (-1.471)	-0.2355 (-1.425)	0.1338 (0.959)	0.0539 (0.352)	-0.3055 (-2.551)**	-0.3040 (-2.294)**
Man/union relations	0.0864 (2.625)*	0.1070 (2.698)*	-0.0248 (-0.882)	0.0027 (0.081)	0.0358 (1.396)	0.0696 (2.256)**
Management employee relations	0.0795 (1.003)	0.0688 (0.788)	0.1334 (1.842)***	0.1549 (1.954)***	-0.0041 (-0.066)	0.0055 (0.082)

(continued) →

Explanatory variables	Semi-Autonomous Work Groups (Model 1)		Incentive/Bonus Schemes (Model 2)		Quality Circles (Model 3)	
	with number unions	with union density	with number unions	with union density	with number unions	with union density
Workplace size	-0.0190 (-0.305)	-0.0439 (-0.719)	0.0712 (1.208)	0.0436 (0.747)	0.1519 (3.056)*	0.1211 (2.48)**
Org size	0.0012 (0.027)	0.0150 (0.298)	-0.0599 (-1.445)	-0.0414 (-0.87)	0.0959 (2.722)*	0.1140 (2.813)*
Workplace Age	-0.0368 (-0.669)	-0.0849 (-1.441)	-0.0065 (-0.131)	-0.0002 (-0.004)	-0.0685 (-1.551)	-0.1059 (-2.27)*
Private Sector Firm	0.2762 (0.981)	0.2828 (0.903)	1.0463 (3.906)*	1.0218 (3.733)*	0.2084 (0.937)	0.2175 (0.89)
Change in Demand	0.0165 (0.108)	0.0588 (0.349)	0.0949 (0.702)	0.0463 (0.316)	0.0485 (0.4)	-0.0800 (-0.608)
Employee Constraints	0.0293 (1.34)	0.2737 (1.126)	0.1300 (0.636)	0.1252 (0.555)	0.2332 (1.323)	0.3126 (1.62)
Management Constraints	-	-	-	-	-0.2589 (-0.968)	-0.0898 (-0.313)
Mining	-0.4404 (-0.789)	-1.1709 (-1.548)	0.1942 (0.489)	0.0037 (0.009)	-0.6116 (-1.492)	-0.6018 (-1.387)
Elec, gas & water	0.1216 (0.274)	0.0618 (0.13)	0.7243 (1.671)***	0.6908 (1.507)	0.0268 (0.078)	0.0364 (0.098)
Construction	0.1540 (0.412)	0.0913 (0.224)	0.1578 (0.443)	0.0998 (0.26)	0.0566 (0.19)	0.0835 (0.26)
Wholesale & Retail Trade	-0.4263 (-1.592)	-0.6403 (-2.069)**	1.0722 (3.906)*	0.9584 (3.906)*	-0.2680 (-1.413)	-0.3887 (-1.822)***
Transport & Storage	0.6858 (2.077)**	0.599 (1.67)***	0.0151 (0.041)	0.2453 (0.639)	-0.5391 (-1.715)***	-0.5856 (-1.677)***
Communication	0.8913 (2.07)**	0.9497 (2.023)**	1.5121 (3.492)*	1.5133 (3.273)*	0.7969 (2.183)**	1.0201 (2.529)**
Finance, Property & Bus.	-0.0861 (-0.276)	-0.0261 (-0.079)	1.562 (3.906)*	1.4755 (5.906)*	0.0789 (0.357)	0.2662 (1.142)
Public Admin	0.4491 (1.145)	0.3973 (0.95)	0.7731 (1.799)***	0.7796 (1.73)***	0.4134 (1.275)	0.4053 (1.472)
Community Services	0.3725 (1.228)	0.3172 (0.953)	-0.7803 (-2.053)**	-0.6705 (-0.178)	-0.1051 (-0.425)	-0.1408 (-0.521)
Rec, Personal & other	0.2996 (0.864)	0.2831 (0.709)	0.8989 (3.248)*	1.0964 (3.552)*	-0.0913 (-0.323)	0.0741 (0.232)

(continued) →

Explanatory variables	Semi-Autonomous Work Groups (Model 1)		Incentive/Bonus Schemes (Model 2)		Quality Circles (Model 3)	
	with number unions	with union density	with number unions	with union density	with number unions	with union density
Sample size	1679	1443	1679	1443	1679	1443
% implement	15.37	14.97	26.09	25.57	30.43	30.00
% correct	84.7	85.2	76.3	76.2	69.7	70.8

( ) T-values  
 \* significant at 1% level

\*\* significant at 5% level  
 \*\*\* significant at 10% level

**Table A4: ORDERED PROBIT MODEL OF PROBABILITY OF THE WORKPLACE HAVING IMPLEMENTED A HIGH NUMBER OF REFORMS**

Dependent variable; Number of reforms implemented from zero to six

Explanatory Variables	Reform index		
	with union present	with number of unions	with union density
Constant	0.6725 (2.207)**	0.6365 (2.180)**	0.7289 (2.477)**
Comp1	-0.0659 (-0.381)	-0.0561 (-0.327)	-0.0178 (-0.103)
Comp2	-0.0020 (-0.014)	0.1718 (0.117)	0.0375 (0.254)
Comp3	-0.1285 (-1.047)	-0.1185 (-0.969)	-0.0877 (-0.797)
Comp4	-0.1688 (-1.449)	-0.1543 (-1.328)	-0.1291 (-1.109)
Comp5	-0.0578 (-0.548)	-0.0529 (-0.503)	-0.0242 (-0.230)
External Competition	0.2222 (2.876)*	0.2127 (2.756)*	0.2167 (2.796)*
Union Present	-0.1135 (-1.031)	-	-
Number of Unions	-	-0.0138 (-1.049)	-
Union Density	-	-	-0.0031 (-2.688)*
Multinational Corporation	0.2577 (2.529)**	0.2720 (2.679)*	0.2595 (2.562)**
Australian Head Office	-0.2804 (-2.477)**	-0.3062 (-2.716)*	-0.2722 (-2.404)**
Change of Management	0.2996 (5.180)*	0.2924 (5.050)*	0.2931 (5.051)*
High level of Autonomy	-0.1111 (-1.787)***	-0.1030 (-1.661)***	-0.1064 (-1.712)***
Management/ union relations	0.0317 (2.263)**	0.0256 (1.971)**	0.0401 (2.874)*

(continued) →

Management/ employee rel.	0.0181 (0.573)	0.0159 (0.506)	0.0117 (0.373)
Workplace size	0.0725 (3.095)**	0.0795 (3.008)**	0.0729 (3.108)*
Organisation size	0.0302 (1.704)***	0.0311 (1.764)***	0.0420 (2.284)**
Workplace Age	-0.0249 (-1.075)	-0.0226 (-0.959)	-0.0234 (-1.004)
Private Sector Firm	-0.0025 (-0.022)	-0.0199 (-0.167)	-0.0481 (-0.404)
Change in Demand	0.0892 (1.428)	0.0864 (1.383)	0.0876 (1.398)
Technology Constraints	0.0753 (0.759)	0.0612 (0.617)	0.0760 (0.767)
Employee Constraints	0.1569 (1.644)	0.1485 (1.544)	0.1600 (1.675)***
Management Constraints	0.1067 (0.718)	0.0988 (0.672)	0.1107 (0.749)
Staff Level Constraints	0.0263 (0.141)	0.0245 (0.131)	0.0234 (0.124)
Mining	-0.3673 (-1.584)	-0.3372 (-1.452)	-0.3261 (-1.388)
Electricity, gas & water	-0.1724 (-0.944)	-0.1837 (-1.004)	-0.1574 (-0.858)
Construction	-0.4771 (-3.105)*	-0.4838 (-3.143)*	-0.4710 (-3.052)*
Wholesale & Retail Trade	-0.2221 (-2.331)*	-0.2242 (-2.372)**	-0.2535 (-2.669)*
Transport & Storage	-0.1671 (-0.995)	-0.1763 (-1.048)	-0.1524 (-0.907)
Communication	0.7859 (3.680)*	0.7674 (3.612)*	0.7192 (3.352)*
Finance, Property & Bus. Services	0.3469 (3.117)*	0.3174 (2.808)*	0.3045 (2.708)*
Public Administration	0.0189 (0.119)	-0.0093 (-0.059)	0.0167 (0.105)
Community Services	-0.2655 (-2.127)**	-0.2790 (-2.229)**	-0.3035 (-2.389)**
Rec, Personal & other	0.0423 (0.276)	0.0353 (0.229)	0.0540 (0.351)

(continued) →

MU (1)	0.8021 (20.763)*	0.8000 (20.739)*	0.8023 (20.759)*
MU (2)	1.4483 (31.440)*	1.4447 (31.403)*	1.4494 (31.468)*
MU (3)	2.0718 (38.952)*	2.0680 (38.893)*	2.0742 (39.029)*
MU (4)	2.6417 (41.634)*	2.6407 (41.600)*	2.6470 (41.713)*
MU (5)	3.2907 (35.733)*	3.2952 (35.749)*	3.3034 (35.888)*
Sample size	1443	1443	1443
Chi-Squared (32)	178.66*	178.60*	185.99*

( ) T-values

\* significant at 1% level

\*\*\*

\*\* significant at 5% level

significant at 10% level

## REFERENCES

- Belman, D. (1989). *Unions, the Quality of Labour Relations and Firm Performance*, Mimeo, Economic Policy Institute, Washington D.C.
- Blandy, R., Dawkins, P., Gannicott, K., Kain, P., Kasper, W., and Kriegler, R. (1985) *Structured Chaos: The Process of Productivity Advance* Oxford University Press, Melbourne.
- Blandy, R. (1988). "Efficiency and Productivity in the Workplace - Where To Now?" *Australian Bulletin of Labour* 15(1), December.
- Blandy, R. and Brummitt, W. (1990). *Labour Productivity and Living Standards* Allen & Unwin, Sydney.
- Caves, R., Ward, I., Williams, P., and Wright, C. (1987). *Australian Industry: Structure, Conduct, Performance* Second Ed., Prentice Hall, Sydney.
- Callus, R., Morehead, A., Cully, M., and Buchanan, J. (1991). *Industrial Relations At Work: The Australian Workplace Industrial Relations Survey*, Commonwealth Department of Industrial Relations, AGPS, Canberra.
- Crockett G., Dawkins P., Mulvey C., and Miller P. (1992). "The Impact of Unions on Workplace Productivity in Australia." *Australian Bulletin of Labour* 18(2). June.
- Drago R., and Wooden M. (1992). "The Australian Workplace Industrial Relations Survey and Workplace Performance." *Australian Bulletin of Labour* 18(2). June.
- EPAC (1990) *Microeconomic Reform: A Composite Set Of Submission*, (2), AGPS, Canberra.
- EPAC (1991) *Competitiveness - An Economy-Wide Concern*, April, AGPS, Canberra.
- Freeman, R.B. and Medoff, J.L. (1979) "The Two Faces of Unionism", *Public Interest*, 57:69-82.
- Freeman, R.B. and Medoff, J.L. (1984) *What Do Unions Do?*, Basic Books, New York.
- Greene, W.H. (1992). *Limdep Version 6.0*, Ecometrics Software Inc., New York.
- Industry Commission (1990) *Annual Report 1989-90*, AGPS, Canberra.

- Kasper, W. (1990) "Product Market Competition" in *The Good Fight: Essays In Honour of Austin Stewart Holmes*, Chris Ulyatt (ed), Allen & Unwin, Sydney.
- Klein, B.H. (1977) *Dynamic Economics* Harvard Uni Press, Massachusetts.
- Machin, S. (1987). *Union Productivity Effects in British Engineering*, Mimeo, University of Warwick, December.
- Machin, S. and Wadwhani, S. (1989) "The Effects Of Unions On Organisational Change, Investment and Employment: Evidence From WIRS", LSE Centre for Labour Economics, Discussion Paper 355, August.
- Maddala, G.S. (1983) *Limited-Dependent and Qualitative Variables in Econometrics* Cambridge University Press,
- Metcalf, D. (1990a). "Union Presence and Labour Productivity in British Manufacturing Industry: A Reply To Nolan and Margison", *British Journal of Industrial Relations*, 28(2), pp.228-49.
- Metcalf, D. (1990b). "Industrial Relations and the 'Productivity Miracle' in British Manufacturing Industry in the 1980's" ANU Disc. Paper 231, April.
- Pencavel, J. (1977). "Distributional and Efficiency Effects of Trade Unions In Britain", *British Journal of Industrial Relations*, 28, pp227-247.
- Porter, M.E. (1990). *The Competitive Advantage Of Nations*, MacMillan, London.
- Sentry Holdings (1989) in PAPPAS et. al, (1990) *The Global Challenge: Australian Manufacturing In The 1990's*, Report to the Australian Manufacturing Council, Melbourne.
- Wilson, N. (1989). "Unionisation, Wages and Productivity: Some British Evidence", University of Bradford Management Centre, Occasional Paper 8901, January.

# A Logistic Model of Technological Change Determinants in Australian Workplaces

Ray Brooks & Alan Morris

## INTRODUCTION

As an industrial relations issue, technological change is usually considered from the perspective of its expected impact on employment levels and the organisation of work, and an extensive literature based around these themes appeared after the onset of the so-called microelectronic revolution of the 1970s. (For some recent examples of this literature, see Bamber & Lansbury 1990; Daniel & Hogarth 1990; Daniel 1987). Technological change does of course have other important dimensions, not the least of which is its effect on overall economic performance; and, from the point of view of performance, the decade of the 1980s was a difficult one for Australia. Against a background of trough, peak and, in the last years of the period, a spiral downward again into trough, a number of important changes were made to institutional arrangements and economic policies. Among these changes was the deregulation of financial markets, together with the floating of the Australian dollar and a progressive reduction in the general level of tariffs. The changes were accomplished in a period marked, particularly in the years after 1986, by on-going balance of payments difficulties, associated with generally unfavourable terms of trade and growing overseas indebtedness, an inflation rate that left Australian exporters in a non-competitive position vis-a-vis overseas producers, a level of unemployment that remained high compared with earlier post- World War II decades, a shrinking manufacturing base, a high interest rate structure and an indifferent productivity performance.

It is this last difficulty that, in a sense, forms the backdrop for this paper. As Burgess (1990: 4) has pointed out, the productivity performance of the Australian economy has been the subject of scrutiny and criticism from a variety of quarters in recent years; indeed, a recurring theme in the local literature political, industry and academic are the need to improve productivity and competitiveness in the Australian economy. The adoption of the most efficient techniques of production should, at least lead to increases in productivity (BCA 1989; Moore 1989; AMC 1992).

Our interest in this paper therefore lies in the identification of factors that appear to be important in determining the likelihood of the adoption of new technology in Australian workplaces, using data from the Australian Workplace Industrial

Relations Survey (AWIRS). The data indicates that 37 per cent of workplaces in the survey introduced new technology as 'major new plant equipment or office technology' in the two years before the survey, and so here we want to identify those factors that appear to have been important in effecting this change; in other words to examine, on the basis of the AWIRS data, independent variables that are apparently significant in influencing the decision to introduce technological change.

AWIRS has provided a rich source of data about many aspects of industrial relations at the workplace level and, up to a point, information about a wider range of performance indicators, including the extent to which new technology was adopted in Australian workplaces in the two years prior to the survey. For our purpose, however, it is less than ideal, and two matters of concern regarding methodology need to be entered at the outset.

Our method requires the identification of proxies that adequately describe variables significant in technological change decisions. In general, these relate to certain characteristics of firms such as size, labour intensity, the nature of the product market as well as other factors relating to union presence and management performance, which in AWIRS rely very often on perceptions about magnitude. In other words, we will rely entirely on AWIRS for data relating to both the industrial relations and non-industrial relations variables in our models (see Callus 1991: 465 and Plowman 1991: 446 for some observations about the limited extent to which AWIRS considers non-industrial relations variables; and for some observations concerning methodological hazards associated with using those that are available, see Drago and Wooden 1992: 147-48 and Crockett et al 1992 : 124).

A second methodological issue concerns the specification of question *ge1g* in the survey, which forms the basis of the dependent variable in our model. As a description of new technology, or technological change, it is very broad and can be contrasted with questions about technological change in the British Workplace Industrial Relations Survey (WIRS84). Recent British research on technological change using WIRS84 as the data base (Latreille 1992: Machin & Stewart 1990; Machin & Wadhwani 1989), has been based on three forms of change identified in the survey, thus enabling a much tighter definition.<sup>1</sup> The distinctions made in the British survey have avoided one important difficulty attached to using AWIRS as a data source for questions about technological change: The problem, indeed impossibility, of separating 'new technology', as the term is generally understood, from simple replacement of capital equipment. The survey question in AWIRS could allow technology ranging from innovations of a major kind that completely replaced old modes of production (or delivery) such as in computerisation, to changes amounting to little more than replacements of older vintages of capital with new equipment, but which involved no fundamental changes in its basis of operation. This lack of qualitative distinction is matched by what amounts to a quantitative lack as well; question *ge1g* presumably encompasses technological

1

In the British survey, technological change was defined as:

- (i) advanced technical change: the introduction of new plant, machinery or equipment that included microelectronics technology (including computer controlled plant machinery and equipment);
- (ii) conventional technical change: the introduction of new plant, machinery or equipment, not incorporating microelectronics (excluding routine replacement);
- (iii) organisational change: substantial changes in work organisation or work practices not involving new plant machinery or equipment (See Daniel 1987:4).

change involving no more than the purchase of a personal computer, to change involving massive outlay on, say, CAD/CAM equipment.

## AN OVERVIEW OF RECENT RESEARCH

In the technological change literature, a number of common themes are evident. These relate to certain characteristics of the workplace, and to market environments within which they operate.

Firm size, as measured by employee numbers is firmly established in the literature as an important explanator of technological change. In an early attempt to model technological change, Davies (1979) argued that firms would adopt new technology if the expected pay-off period from its use was less than or equal to some critical pay-off period; and the expected pay-off period was a function of firm size, other firm characteristics and time. Among earlier studies based on survey data, Benvignati examined the conditions most favourable to innovation by individual firms, and concluded that the probability of being an adopter increased with employment size (1982: 330). In a more recent study based on the British private manufacturing sector, Latreille found establishment size, measured in terms of employee numbers, was positively and significantly related to adopted (1992: 37). The conclusions in favour of a significant relationship between firm size and the propensity to innovate is given broad support in later studies (see, for example, Lintner et. al. 1987: 24; Machin and Whadwhani, 1991: 327), although the latter authors, in a study of the effect of unions on investment and innovation, did conclude that the impact of a head count measure of firm size varied: An increase in establishment size was initially associated with higher levels of investment, but beyond a certain point, size appeared to be disadvantageous (1991: 327). Raw data from WIRS84 indicated that technical change was more common in larger workplaces (Daniel 1987: 14-15), and responses to question ge1g in AWIRS suggest a similar pattern. On the basis then of conclusions drawn in both the theoretical and empirical diffusion literature, we expected that firm size would be a significant and positive explanator of technological change in Australian workplaces.

In so far as market characteristics might affect technological change, the evidence from existing studies appears to, as it were, point in both directions. Economic theory, associated with the Schumpeter-Galbraith hypothesis, suggests that technological change is more likely, other things being equal, in concentrated markets where competitive pressures are missing, while firms in competitive markets usually lack necessary financial resources for innovation (see Stoneman 1983: 238-44 for a review of the theoretical literature). As Latreille (1992: 39) has argued, this argument is less than wholly convincing when viewed in the light of results obtained from empirical studies. Romeo, for example, found that competitive pressures did appear to lead to higher rates of diffusion of innovations (1977: 69), while Daniel (1987: 20) has pointed out that responses to WIRS84 show a positive relationship between competitive product markets and the introduction of technological change. Latreille, however, found no support for a positive relationship in his study of the adoption of microelectronic technologies in the British private manufacturing (1992: 48).

In spite of clear differences on the matter, when considered in the light of the AWIRS data, it seemed not unreasonable to anticipate that a workplace in a growing, predictable market, facing overseas competition, and operating at full

capacity would be more likely to innovate than not. On the other hand workplaces operating in markets where the degree of competition was low, or where the workplace was operating at less than full capacity in a declining market, would be more likely to be non-adopters. Despite uncertainty about the direction of the relationship between technological change and market characteristics, we expected these indicators, in their various forms in AWIRS to be significant.

Other workplace characteristics that we thought, *prima facie*, would be significant in explaining technological change were first, the labour intensity of the workplace as measured by perceptions of labour costs as a proportion of total workplace cost; second, whether the workplace was operating at or below full capacity; and third, whether the workplace was foreign-owned.

High labour intensity could mean a number of things with respect to the adoption of new technology. Workplaces using labour intensive techniques could, for example, have a motivation for substituting these for capital intensive techniques for reasons of cost or control. Latreille explored both possibilities but in the end doubted, on the basis of his results, that such substitution had occurred in the British private manufacturing sector (1992: 44). It could also mean a workplace activity that did not readily lend itself to the application of techniques of a capital intensive kind, or quite simply, an inability to raise capital in sufficient quantity. We thought the variable, as measured by management perceptions of labour costs as a proportion of total costs, interesting in so far as it might be a proxy for the extent to which management had a motive for introducing technological change.

On the basis of WIRS84 data, Daniel argued that overseas companies were 'consistently much more likely than British counterparts to use advanced technology' (1987: 271). Machin and Whadwhani (1991:328) also found a tendency for foreign-owned firms to be more likely to introduce new technology, although a foreign ownership variable in Latrielle's models gave mixed results (1992: 42-43). The balance appeared to tilt toward a positive relationship between foreign ownership and the introduction of technological change, and we expected this to be reflected in our results.

The question of the impact of unions on technological change has received a great deal of attention in both Australia and overseas. In the theoretical literature, two general views of the role of unions, as it might apply to technological change, can be identified. One view, based on neo-classical economic theory, suggests unions must necessarily hamper the efficiency of firms through the exercise of monopoly power (Stoneman 1983). A popular inference drawn from this view is that unions must be resistant to change generally, and technological change in particular: 'The phrases worker resistance to technical change and union resistance to technical change are built into the language of industrial innovation' (Daniel & Hogarth 1990: 85). On the other hand, the view put by Freeman and Medoff (1984), suggests that, far from hampering the efficiency of firms, unions can augment it through the exercise of collective 'voice'. These extremes have inspired a great deal of research, and although much recent debate on the issue of union impact has centred on productivity (see, for recent examples of this debate, Addison & Hirsch 1989; Alexander & Green 1992; Drago & Wooden 1992), there is also a significant body of recent research built around an examination of the nature of the relationship between unions and technological change as such. Benvignati (1983), found that the probability of adoption increased with union representation, and Tauman and Weiss (1987) also concluded that in certain circumstances, unionisation encouraged

innovation. Latreille (1992) in a study that considered, among other things, the impact of manual unions on technological change, found the presence of such unions was both significant and positive, the 'effect proving robust to a variety of changes in both sample and specification' (1992: 48). Other attempts to model the significance of unions on technological change have, however, led to their rejection as significant variables in the process (Lintner et. al. 1987; Machin & Whadwhani 1991). And from his analysis of the WIRS84 data, Daniel concluded that 'there was very little association in either direction between trade union organisation and the introduction of change. Where, however, there was any association, it tended to be positive' (1987: 262).

In Australia, recent debate about the role of unions in the change process generally was stimulated by a view put in 1989 by the BCA Industrial Relations Study Commission that 'it invariably will be more time consuming and difficult to negotiate change with five trade unions in a workplace than with one. And even when there is only one, it will be more difficult to negotiate change with a union with a non-workplace focus' (BCA 1989: 71). In the earliest analysis of the AWIRS results, this argument was contested on the basis of both the amount of change that had occurred in Australian workplaces in the two years prior to the survey and, a view that emerged from management itself: That change was hampered, not so much by industrial relations factors, as by factors such as capital limitations, a view similar to one expressed by British managers in the WIRS84 survey (Callus et. al. 1991: 213. See also Angwin 1992: 67-69, for a response to this view; for WIRS84, see Daniel, 1987: 272).

We have used a number of union variables from the AWIRS data set, including measures of whether or not there was union presence, union density and the number of unions present at any workplace. In addition, as a first, imperfect attempt to proxy Blackburn's notion of 'unionateness', we included variable n29 derived by Callus et. al. (1991: 150-51) which is intended to describe both active and inactive employee organisations. As Blackburn argued, size or even of itself, density, are not sufficient to describe character; these will depend on a number of factors and are only covered in an imperfect way by the derived variable used here<sup>2</sup>. Nevertheless, the derived variable goes beyond more usual measures of unionisation, and we thought it would be interesting to use it as a first attempt at characterising unions according the typology suggested by Callus et. al., to examine what impact, if any, it had on technological change.

Given the extent of the controversy surrounding the issue of the effect of unions on technological change, it was not clear, *a priori*, what signs the union variables in the models would have. We did expect, however, that one or more of them would be significant.

While the role of management in effecting technological change is critically important, the precise nature of the role has received far less scrutiny, and has been the subject of relatively little debate when compared with the intellectual energy

<sup>2</sup> Blackburn argued that the conventional measure of unionisation, density - or in his terminology 'completeness' - does not adequately explain the social significance of unionism; that measured in conventional terms, high density in some white collar occupations such as retailing or banking would lead to the 'unsatisfactory conclusion that unionisation is as high as in mining or bus driving'. Thus another variable is required, and this according to Blackburn, is unionateness which depends in some general sense on the level of commitment of a union to the principles and ideology of trade unionism' (1976: 266-67).

given over to the role of unions in the process. It is possible to discern however, at least in the British and Australian literature, an uneasiness about management performance in both countries on the score of technological change (Daniel 1987: 272-75; SSCIST 1988: 57; BCA 1989: 75; SSCIST 1990: 70-72). Here, we are concerned not so much with factors that may have inhibited management, but with identifying those variables that appear to be associated with 'adopting' management. In doing this, we assumed that performance indicators such as profitability or changes in market share would not necessarily be associated with innovative management, and so we looked to other variables available from the AWIRS data, such as the use of advanced management techniques and workplace performance data, as indicators of the significance of management in technological change in Australian workplaces.

## THE MODEL

In spite of what are frankly acknowledged as data limitations, it is proposed to construct models based on an assumption that technological changes will be introduced if decision makers perceive a net benefit will result. In all cases net benefit is unobservable to those outside the workplace, and in many instances is not quantifiable; nevertheless, it will be assumed that rational decision makers introduce new processes and new equipment when the expected present value of future benefits exceed their outlay costs.

In the case of trading enterprises, the notion of net benefit is closely associated with profit, and profit maximising behaviour. For non-trading enterprises however, the notion of net benefit is less clear-cut. It may mean reductions in costs, and would therefore be akin to increased profits; alternatively, it could be associated with qualitative improvements in output where no monetary return accrues. As a consequence of this conceptual difficulty, models which purport to describe all workplaces may be open to question.

Since a considerable part of the literature deals with technological change in manufacturing, we will construct three versions of the model based on:

- i) all workplaces;
- ii) manufacturing workplaces;
- iii) non-manufacturing workplaces.

Industry dummies are used to capture inter-industry differences which in part deal with both the trading/non-trading problem, and differences in the inter-industry potential to innovate.

The model proposed is that the perceived net benefit  $B_i$  in the  $i^{\text{th}}$  workplace is a linear function of a set of characteristics of the  $i^{\text{th}}$  workplace described by the vector  $X_i$ . This vector contains:

- (a) industry dummy variables that capture inter-industry differences in the potential to introduce technical change;
- (b) market competition indicators;
- (c) certain management characteristics;
- (d) union variables.

The model is therefore described by the equation:

$$B_i = \beta \cdot X_i + \mu_i \quad (1)$$

where  $\mu_i$  is NID  $(0, \sigma^2)$ .

In principle, rational decision makers will implement technical change whenever  $B_i > 0$ . Although  $B_i$  is unlikely to be known with certainty by any manager, it can be regarded as an index of the probability that a workplace will adopt new technology. If  $p_i$  is defined as the probability that the  $i^{\text{th}}$  workplace does adopt new technology during the survey period, and  $T_i = 1$  if the workplace indicates that this change occurred, or  $T_i = 0$  otherwise, the model requires that:

$$\begin{aligned} B_i > B_j &\rightarrow p_i > p_j \\ p_i &= \Pr(T_i = 1) \rightarrow 1 \text{ as } B_i \rightarrow +\infty \\ \text{and } p_i &= \Pr(T_i = 0) \rightarrow 0 \text{ as } B_i \rightarrow -\infty \end{aligned}$$

The logistic function has been chosen as the basis for estimating the model because, in addition to permitting tests for statistical significance on explanators, it allows simple yet meaningful interpretations of the regression coefficients.

The logistic function is written as:

$$\log \left\{ \frac{p_i}{1-p_i} \right\} = \beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki} + \mu_i \quad (2)$$

or

$$\frac{p_i}{1-p_i} = \exp(\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki} + \mu_i) \quad (3)$$

The left hand side of equation (3) represents the odds in favour of technical change occurring at the  $i^{\text{th}}$  workplace, and it is easy to show that  $\beta_j$  is the impact of a unit change in  $X_j$  on the logarithm of the odds in favour, other things being equal. Since the meaning of the logarithm of the odds is not intuitively obvious, it is more useful to focus on the impact of a unit change in  $X_j$  on the odds; it can be shown that  $\exp(\beta_j) - 1$  is the proportional change in the odds in favour, other things being equal<sup>3</sup>

## THE DATA

Of the 2004 responses to the question, 737 workplaces in the survey (36.8 per cent) indicated that technological change had occurred in the previous two years. The incidence of technological change in all workplaces, manufacturing workplaces and non-manufacturing workplaces is shown in Table 1.

We did not eliminate workplaces that had existed for less than two years from the analysis. While it might be supposed that such workplaces would, almost by definition, report the introduction of new technology in the two years prior to the survey, we found in fact that they reported almost the same incidence of technological change (34.4 per cent) as older workplaces (36.8 per cent). Had it been otherwise, workplaces less than two years old would have been excluded from

the models. However a chi square test was unable to reject the null hypothesis that the reporting of technological change is independent of whether or not a workplace was less than two years old; consequently these workplaces were not eliminated<sup>4</sup>.

**TABLE 1 INCIDENCE OF TECHNOLOGICAL CHANGE**

	Number	Per cent	Sample size
All workplaces	737	36.8	2004
Manufacturing workplaces	236	48.1	491
Non-manufacturing workplaces	501	33.1	1513

Source: AWIRS (1991)

Population: Australian workplaces with at least twenty employees that reported technological change during the two years prior to the survey.

Figures are unweighted and are based on responses from 2004 workplaces.

The AWIRS data set has weights that permit the adjustment of the sample so that its proportions are the same as those in the population of workplaces. The purpose of the weights is to enable estimations of the number of workplaces in the population exhibiting particular characteristics, so that if the weights are to be used in inferential statistical analysis, they must be re-scaled in order to avoid artificially enlarging the sample. If weights were applied in the logistic regression analysis upon which our model is based, there would be an implied assumption that this size-adjusted observed sample would have had the same response characteristics as a different but more representative sample of the population. Unweighted data is therefore used, even though the proportionality problem is acknowledged. If the sample is not random - which is the basis of the problem - the application of weights will not conjure genuine randomness, so the approach adopted here is to accept the non-randomness of the data (and its consequent limitations), rather than use weighted data which, in our view, might lead to wrongly based conclusions.

The means of all explanatory variables are shown in Table 2.

## ECONOMETRIC RESULTS

### All Industries Model

In the all industries model, 717 of the 1946 workplaces reported technological change in the two years prior to the survey (workplaces were excluded where at least one of the variables in the model had missing values). Therefore, the probability that a workplace selected at random would report technological change was  $717/1946 = 0.368$ , and the odds in favour were  $0.368/(1 - 0.368) = 0.582$ . This figure becomes the benchmark for assessing the impact, on the odds of technological

<sup>4</sup>

Chi square [1]=0.149, Prob=0.699

TABLE 2 MEANS OF EXPLANATORY VARIABLES\*

Variable	Description	All Workplaces	Manufacturing Workplaces	Non-manufacturing workplace
IND_MIN	Mining	0.025		0.033
IND_MAN	Manufacturing	0.252		
IND_ELE	Electricity, gas, water	0.034		0.046
IND_WHT	Wholesale trade	0.037		0.049
IND_RTT	Retail trade	0.111		0.148
IND_TRA	Transport	0.046		0.062
IND_COM	Communication	0.028		0.038
IND_FIN	Finance, property, business services	0.109		0.146
IND_PAD	Public administration, defence	0.052		0.070
IND_CSE	Community services	0.180		0.241
IND_REC	Recreation, personal services, other	0.069		0.092
FOREIGN	Foreign ownership (ga4 =3 or 4)	0.121	0.230	0.084
AGE	Less than 20 years old (ga 3< 5)	0.396	0.402	0.394
SIZE	Number of workers (ga1)	234.092	268.192	222.561
LAB	Labour intensity (gc1 re-formatted)	2.896	2.288	3.102
CAPAC	Full capacity (gc2=1)	0.401	0.323	0.427
COMP	Many competitors (gb4=1)	0.359	0.409	0.342
DEG_COM	Degree competition high (gb5>3)	0.547	0.814	0.457
MAR_EXP	Export market (gb3=3)	0.024	0.052	0.015
MAR_IMP	Domestic and import market (gb3=2)	0.213	0.438	0.137
MAR_GROW	Growing market (gb7=1)	0.556	0.447	0.593
MAR_DECL	Declining market (gb7=3)	0.123	0.157	0.111
MAR_PRED	Predictable market (gb9=1)	0.812	0.780	0.822
NOU	Number of unions (ek1 re-formatted)	2.790	3.004	2.717
UNION	Union presence (gl=1)	0.855	0.861	0.853
DENSITY	Union density (n40)	60.135	61.124	59.801
TYPE_ACT	Active union (n29=5)	0.203	0.311	0.167
TYPE_INAC	Inactive union (n29=4)	0.081	0.076	0.083
MONITOR	Monitor labour productivity (gc10=1)	0.708	0.788	0.681
CIRCLES	Quality circles (ea31g=1)	0.284	0.319	0.272
CIM	Computer integ. management (ea31i=1)	0.221	0.214	0.223
JIT	Just in time (ea31j=10)	0.086	0.238	0.035
TQC	Total quality control implem. (ea31h=8)	0.277	0.473	0.210
AUDIT	Skills audit undertaken (ea31e=5)	0.190	0.228	0.177
DESIGN	Job redesign implemented (ea31b=2)	0.430	0.433	0.429
NEW_PROD	New product (ge1a=1)	0.172	0.195	0.165
NEW_WORK	Re-structuring of work (ge1b=2)	0.371	0.307	0.393
NEW_OWN	New owner (ge1c=3)	0.149	0.223	0.123
NEW_COMM	New commercial operations (ge1d=4)	0.250	0.202	0.267
NEW_STRU	New management structure (ge1e=5)	0.435	0.385	0.452
NEW_MAN	New management (ge1f=6)	0.432	0.409	0.439

\* The means of all variables (other than ga1, ek1 re-formatted and n40) should be interpreted as the proportion of workplaces for which the associated dummy variable is equal to 1.

change occurring, of unit changes in the explanatory variables included in the models. Note that in all interpretations of the impact of unit changes in the explanators on the odds, the qualification is implied that it is on average and all other things being equal.

The interpretations that follow refer to models in which variables not significant at 0.40 per cent on a two sided test were excluded, except in the case of industry dummies. This procedure has also been adopted in the two subsequent models.

In the all industries model, the omitted industry dummy is that for the construction industry, which reported a low incidence of technological change. All industry dummy coefficients in effect make comparisons with the construction industry.

From Table 3, it is evident that in the union presence model, industries with significant and large probabilities of technological change occurring are manufacturing (IND\_MAN), wholesale trade (IND\_WHT), transport (IND\_TRA), communication (IND\_COM) and public administration (IND\_PAD). The odds in favour of technological change occurring in these industries are 179.3 per cent, 160.9 per cent, 93.1 per cent and 166.4 per cent and 131.6 per cent higher respectively, than in the construction industry.

Union presence at the workplace (UNION) had a significant and large negative impact on the probability of technological change; the odds in favour were reduced by 38.9 per cent. Increases in the number of unions (NOU) did however have a significant and positive influence on the probability of technological change, but the effect in most cases was insufficient to override the negative impact of union presence. The odds in favour of change were increased by 6.0 per cent per additional union at the workplace, thus requiring at least seven unions to yield a positive total effect. Since the average number of unions per workplace was 2.79, it is reasonable to conclude that for most firms the union effect was negative.

The presence of an active union (TYPE\_ACT) or an inactive union (TYPE\_INAC) - derived variable N29 codes 5 and 4 respectively - were not significant at reasonable levels. The positive signs of both coefficients did, however, provide weak evidence that unions of both kinds may facilitate innovation; but there was no evidence to suggest that an assertive union stance reduced the probability of technological change. Union density (DENSITY) performed very poorly and was omitted from the model.

In so far as market variables were concerned, both market growth (MAR\_GROW) and market predicability (MAR\_PRED) were significant in increasing the probability of technological change; the odds on favour were increased by 41.8 per cent and 31.7 per cent respectively when markets were growing and predictable. The effect of perceptions of a declining market (MAR\_DECL) was not significantly different from that of an unchanging market; similarly, neither a workplace orientation toward production for export (MAR\_EXP), or import competition (MAR\_IMP) were significant. The number of competitors (COMP) and the presence of strong competition (DEG\_COM) appeared unimportant as an influence on the probability of technological change.

Although the level of capacity utilisation (CAPAC) was not quite significant at 10 per cent, the negative coefficient was counter to expectations. A possible explanation might be that a workplace operating at full capacity would simply see

little need to introduce new technology, since its objectives were currently being met by existing production methods.

Not surprisingly, variables intended to proxy innovative management provided a strong, positive, indication that they were associated with technological change. The use of computer integrated management (CIM), just in time (JIT), job redesign (DESIGN), the introduction of new products (NEW\_PROD), new work practices (NEW\_WORK) and new management (NEW\_MAN) were all significant and had relatively large effects. The odds in favour were increased by 23.0 per cent, 55.0 per cent, 35.7 per cent, 92.7 per cent, 64.0 per cent and 23.4 per cent respectively by each of these factors.

Workplaces established for less than twenty years (AGE) were significantly less likely to have innovated, which may mean that it was older workplaces that were forced to replace obsolete with new technologies. The model provides no evidence that newer workplaces were more innovative in this sense, and the odds in favour of a workplace less than twenty years old introducing technology were reduced by 29.9 per cent. The probability of innovation was also significantly less likely in labour intensive workplaces. The coefficient of the ratio of labour cost to total cost (LAB) indicated that the odds in favour decreased by 10.0 per cent per additional 20 per cent in the ratio, so that there was no evidence to suggest that labour intensive workplaces introduced technological change as a means of reducing the labour components of total cost.

In view of the significantly large body of research findings that ascribe an important role to firm size in decisions to innovate, it was surprising to discover in our all industries model that firm size (gal) was not significant. Similarly, foreign ownership was not significant in explaining the probability of technological change.

Overall then, in the all industries model, variables that proxied innovative management exercised a positive effect on the likelihood of technological change. Union variables gave mixed results although their net effect was negative in most cases. The effect of market variables was mixed, but it is worthwhile noting the strong positive effects of both market growth and predicability.

High labour intensity had a negative effect on the likelihood of innovation, and both size and foreign ownership were not significant.

**TABLE 3 ANALYSIS OF MAXIMUM LIKELIHOOD ESTIMATES  
- ALL INDUSTRIES**

Variable	Model 1 All Explanators		Model 2 Weak Explanators Deleted <sup>†</sup>		Impact on Odds <sup>§</sup>
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	
INTERCPT	-1.995	0.412	-1.649	0.356	
IND_MIN	0.889*	0.472	0.012	0.427	0.844
IND_MAN	1.312***	0.327	1.027***	0.280	1.793
IND_ELE	0.789**	0.406	0.580	0.374	0.786
IND_WHT	1.230***	0.412	0.959***	0.355	1.609
IND_RTT	0.692	0.357	0.322	0.308	0.380
IND_TRA	0.901**	0.383	0.658*	0.345	0.931
IND_COM	1.246**	0.438	0.980**	0.393	1.664
IND_FIN	0.725**	0.349	0.482	0.309	0.619
IND_PAD	0.995**	0.379	0.840**	0.343	1.316
IND_CSE	0.593*	0.331	0.408	0.295	0.504
IND_REC	0.452	0.370	0.198	0.324	0.219
FOREIGN	-0.014	0.178			
AGE	-0.372***	0.117	-0.355***	0.108	-0.299
SIZE	0.00010	0.00011	0.00006	0.00009	0.00006
LAB	-0.054	0.055	-0.105**	0.050	-0.100
CAPAC	-0.177	0.117	-0.173	0.107	-0.159
COMP	0.0052	0.154			
DEG_COM	-0.028	0.162			
MAR_EXP	-0.527	0.381	-0.501	0.356	-0.394
MAR_IMP	-0.0092	0.153			
MAR_GROW	0.452***	0.125	0.349***	0.104	0.418
MAR_DECL	0.061	0.189			
MAR_PRED	0.262*	0.147	0.275**	0.134	0.317
NOU	0.049*	0.028	0.058**	0.024	0.060
UNION	-0.538**	0.237	-0.493***	0.161	-0.389
DENSITY	0.00056	0.0026			
TYPE_ACT	0.103	0.156			
TYPE_INAC	0.251	0.203	0.169	0.183	0.184
MONITOR	0.107	0.127	0.172	0.115	0.188
CIRCLES	0.147	0.130	0.080	0.115	0.083
CIM	0.204	0.134	0.207*	0.122	0.230
JIT	0.431**	0.205	0.438**	0.182	0.550
TQC	-0.037	0.134			
AUDIT	0.049	0.147			
DESIGN	0.228*	0.118	0.305***	0.182	0.357
NEW_PROD	0.640***	0.143	0.656***	0.133	0.927
NEW_WORK	0.536***	0.119	0.495***	0.108	0.640
NEW_OWN	0.054	0.158			
NEW_COMM	0.161	0.132	0.160	0.122	0.174
NEW_STRU	-0.0076	0.120			
NEW_MAN	0.205*	0.117	0.214**	0.104	0.234

2 Log likelihood	2000.0	2332.5
Chi-square (df = 41)	204.8***	(df = 30) 228.9**
R <sup>2</sup> <sub>p</sub>	0.656	0.671
Sample size	1662	1946

\* Significant at 10 per cent on a two-sided test using Wald Chi-square.

\*\* Significant at 5 per cent on a two-sided test using Wald Chi-square.

\*\*\* Significant at 1 per cent on a two-sided test using Wald Chi-square.

† Not significant at 40 per cent on a two-sided test, apart from industry dummies.

§ Effect of a unit increase in a variable on the odds in favour of technological change occurring.

## MANUFACTURING

In the model based on manufacturing only, 206 of the 424 workplaces reported technological change in the two years prior to the survey. The probability that a workplace selected at random would report technological change was therefore  $206/424 = 0.486$ , so that the odds in favour of change were  $0.486/(1-0.486) = 0.947$ .

The effect of union presence at the workplace (UNION) had a significant and large negative impact on the probability of technological change in manufacturing, with the odds in favour of change being reduced by 55.2 per cent. This outcome was not significantly different from that of the all industries model, although other union variables, apart from union density (DENSITY), performed very poorly as explanators and were deleted from the model.

Market variables performed in much the same way as in the all industries model; market growth (MAR\_GROW) and market predicability (MAR\_PRED) were again significant in increasing the probability of innovation, with the odds in favour of change increased by 87.2 per cent and 61.4 per cent respectively. The effect of a decline in the market (MAR\_DECL) was not significantly different from that for an unchanging market. Similarly, neither an export orientation (MAR\_EXP) or the presence import competition (MAR\_IMP) were significant. The level of capacity utilisation (CAPAC) was not significant but the negative coefficient - indicating that as capacity increased, the likelihood of technological change diminished - was counter to both our expectations and the sign in the all industries model. We did find however, that although the number of competitors in the market (COMP) was a poor explainer, the degree of competition (DEG\_COM) was significant, with moderate to intense competition having a positive impact. Competition of this order increased the odds in favour of change by 74.0 per cent.

In the all industries model, variables intended to proxy innovative management gave strong indication of affecting technological change in a positive manner. They performed much less impressively in manufacturing, however. The use of computer integrated management (CIM), the initiation of job redesign (DESIGN), and the introduction of a new product (NEW\_PROD) were significant, the odds in favour of change increasing by 78.6 per cent, 52.0 per cent and 113.0 per cent respectively. Although the other management variables performed rather poorly in this model, it is perhaps worthwhile pointing out that most had positive coefficients and were all positive in the model from which the weaker variables were omitted.

Whether or not a workplace was established for less than twenty years (AGE) did not significantly influence the probability of it reporting technological change, and the negative sign of the coefficient matched that in the all industries model. In so far as the labour/capital ratio of manufacturing workplaces was concerned, the probability of innovation was not significantly less in labour intensive workplaces (LAB), although the coefficient was negative, again suggesting support for the proposition that labour intensity will mean a lowered likelihood of technological change.

**TABLE 4 ANALYSIS OF MAXIMUM LIKELIHOOD ESTIMATES - MANUFACTURING SECTOR**

Variable	Model 1 All Explanators		Model 2 Weak Explanators Deleted <sup>†</sup>		
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Impact on Odds <sup>§</sup>
INTERCPT	-1.151	0.654	-1.065	0.572	
FOREIGN	0.309	0.277	0.330	0.265	0.391
AGE	1.360	0.234	-0.349	0.227	-0.295
SIZE	0.00080*	0.00044	0.00074**	0.00036	0.00077
LAB	-0.189	0.123	-0.193	0.118	-0.176
CAPAC	-0.257	0.243	-0.284	0.236	-0.247
COMP	0.062*	0.251			
DEG COM	0.539	0.311	0.554*	0.285	0.740
MAR_EXP	-0.749	0.543	-0.741	0.510	-0.523
MAR_IMP	-0.043	0.241			
MAR_GROW	0.694**	0.246	0.627***	0.222	0.872
MAR_DECL	0.234	0.320			
MAR_PRED	0.470*	0.274	0.479*	0.268	0.614
NOU	-0.014	0.058			
UNION	-0.801*	0.472	-0.804*	0.459	-0.552
DENSITY	0.0059	0.0056	0.0061	0.0050	0.006
TYPE_INAC	0.086	0.296			
TYPE_REA	0.291	0.430			
MONITOR	0.021	0.278			
CIRCLES	0.236	0.257	0.346	0.233	0.413
CIM	0.509*	0.272	0.580**	0.264	0.786
JIT	0.189	0.276			
TQC	0.138	0.230			
AUDIT	0.074	0.275			
DESIGN	0.414*	0.229	0.419*	0.225	0.520
NEW_PROD	0.723**	0.285	0.756***	0.277	1.130
NEW_WORK	0.262	0.248	0.282	0.241	0.326
NEW_OWN	0.013	0.269			
NEW_COMM	-0.059	0.281			
NEW_STRU	-0.102	0.253			
NEW_MAN	-0.042	0.245			

2 Log likelihood	516.7	523.1
Chi-square (df=30)	65.5***	(df=16) 64.3***
R <sup>2</sup> <sub>p</sub>	0.583	0.627
Sample size	420	424

\* Significant at 10 per cent on a two-sided test using Wald Chi-square

\*\* Significant at 5 per cent on a two-sided test using Wald Chi-square

\*\*\* Significant at 1 per cent on a two-sided test using Wald Chi-square

† Not significant at 40 per cent on a two-sided test, apart from industry dummies

§ Effect of a unit increase in a variable on the odds in favour of technological change occurring

Whereas size (gal) was not significant in the all industries model, in manufacturing it proved to be highly significant in explaining the probability of technological change, with the odds in favour increasing by 7.7 per cent per additional hundred workers.

Foreign ownership (FOREIGN) was not significant, although the sign of the coefficient provided weak evidence that foreign ownership may have had a positive effect on innovation.

Our manufacturing industry model gave results not markedly different from those of the all industries model, except that management variables, while still operating positively, performed less impressively as explanators; and workplace size was a factor in the likelihood of technological change. The influence of union variables was not marked, although on balance they appear to have had a small negative impact.

## NON-MANUFACTURING

In our final model, 495 of 1500 non-manufacturing workplaces reported technological change. The probability that a workplace selected at random would report technological change was therefore  $495/1500 = 0.330$ , so that the odds in favour were  $0.330/(1 - 0.330) = 0.493$ .

As shown in Table 5, industries with significant and large probabilities of technological change occurring were mining (IND\_MIN), wholesale trade (IND\_WHT), retail trade (IND\_RTT), transport (IND\_TRA), communications (IND\_COM), finance, property and business services (IND\_FIN), and public administration (IND\_PAD). For these industries, the odds in favour of innovation were 116.0 per cent, 220.0 per cent, 74.4 per cent, 82.9 per cent, 139.6 per cent, 72.3 per cent and 110.4 per cent higher respectively, than in the construction industry.

Union presence at the workplace (UNION) had a significant and large negative impact on the probability of technological change, the odds in favour being reduced by 41.7 per cent. As the number of unions (NOU) increased, there was a significant and positive influence on the probability of technological change, the same effect observed in the all industries model. Again however, the effect in most cases was not sufficient to override the negative impact of union presence. The odds in favour were increased by 6.2 per cent per additional union at the workplace, which meant a requirement of at least seven unions at a workplace to yield a positive total effect, the same as in the all industries model. Since the average number of unions per workplace was 2.72 (see Table 2), it is reasonable to conclude that for most firms the unions effect was negative. All other union variables performed poorly, and were deleted from the model.

Market growth (MAR\_GROW) was significant in increasing the probability of technological change, and the odds in favour were increased by 36.5 per cent. The level of capacity utilisation (CAPAC) was also significant, but had a negative coefficient as in the manufacturing model. The odds in favour of change were reduced by 19.3 per cent in workplaces operating at full capacity.

**TABLE 5 ANALYSIS OF MAXIMUM LIKELIHOOD ESTIMATES - ALL INDUSTRIES EXCLUDING MANUFACTURING**

Variable	Model 1 All Explanators		Model 2 Weak Explanators Deleted <sup>†</sup>		Impact on Odds <sup>§</sup>
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	
INTERCPT	-1.901	0.450	-1.770	0.349	
IND_MIN	1.020**	0.496	0.770*	0.444	1.160
IND_ELE	0.759*	0.413	0.500	0.374	0.649
IND_WHT	1.414***	0.428	1.163***	0.363	2.200
IND_RTT	0.881**	0.373	0.556*	0.317	0.744
IND_TRA	0.981**	0.390	0.604*	0.345	0.829
IND_COM	1.222***	0.451	0.874**	0.394	1.396
IND_FIN	0.852**	0.361	0.544*	0.315	0.723
IND_PAD	0.928**	0.385	0.744**	0.345	1.104
IND_CSE	0.513	0.338	0.358	0.288	0.294
IND_REC	0.577	0.379	0.340	0.329	0.405
FOREIGN	-0.413	0.262	-0.231	0.225	-0.206
AGE	-0.388***	0.140	-0.361***	0.127	-0.303
SIZE	4.409E-6	0.0001			
LAB	-0.018	0.063			
CAPAC	-0.189	0.138	-0.215*	0.124	-0.193
COMP	0.0022	0.205			
DEGCOM	-0.224	0.199	-0.194	0.154	-0.176
MAR_EXP	-0.581	0.621	-0.570	0.585	-0.434
MAR_IMP	-0.056	0.213			
MAR_GROW	0.382**	0.150	0.311**	0.121	0.365
MAR_DECL	-0.065	0.240			
MAR_PRED	0.169	0.179	0.212	0.159	0.236
NOU	0.062*	0.034	0.060**	0.027	0.062
UNION	-0.503*	0.282	-0.540***	0.188	-0.417
DENSITY	-0.0009	0.0030			
TYPE_ACT	0.046	0.192			
TYPE_INAC	0.212	0.236	0.173	0.208	0.189
MONITOR	0.129	0.146	0.210	0.130	0.234
CIRCLES	0.170	0.156	0.120	0.132	0.127
CIM	0.096	0.159			
JIT	0.677**	0.345	0.464	0.290	0.590
TQC	-0.106	0.172			
AUDIT	0.011	0.180			
DESIGN	0.176	0.141	0.241*	0.124	0.273
NEW_PROD	0.617***	0.169	0.582***	0.155	0.790
NEW_WORK	0.584***	0.138	0.513***	0.124	0.670
NEW_OWN	0.108	0.204			
NEW_COMM	0.244	0.154	0.257*	0.139	0.293
NEW_STRU	0.044	0.140			
NEW_MAN	0.300**	0.137	0.293**	0.120	0.340

2 Log likelihood	1453.7		1754.4
Chi-square (df=40)	143.5***	(df=28)	148.1***
R <sup>2</sup> <sub>p</sub>	0.669		0.684
Sample size	1242		1500

\* Significant at 10 per cent on a two-sided test using Wald Chi-square

\*\* Significant at 5 per cent on a two-sided test using Wald Chi-square

\*\*\* Significant at 1 per cent on a two-sided test using Wald Chi-square

† Not significant at 40 per cent on a two-sided test, apart from industry dummies

§ Effect of a unit increase in a variable on the odds in favour of technological change occurring

Other market variables were not significant, although some weak evidence suggested that moderate to intense competition had a negative impact, unlike the significant and positive effect found in manufacturing.

Job redesign (DESIGN), the introduction of new products (NEW\_PROD), new work practices (NEW\_WORK), new commercial operations (NEW\_COMM) and new management (NEW\_MAN) variables in the model were all significant and had relatively large effects. The odds in favour of technological change were increased by 27.3 per cent, 79.0 per cent, 67.0 per cent, 29.3 per cent and 34.0 per cent respectively, by these factors. Other management variables, while not significant, had positive coefficients, with the exception of total quality control (TQL).

Workplaces established for less than twenty years (AGE) were significantly less likely to report technological change, the odds in favour being reduced by 30.3 per cent, and in this model both labour intensity (LAB) and size (ga1) were very weak explanators of innovation.

Foreign ownership (FOREIGN) was not significant, but some weak evidence pointed to a negative impact, the reverse of the weak positive impact found in the manufacturing model.

## CONCLUSION

In the three estimated models, there appears to be clear support for the hypothesis that decisions to introduce new technology are influenced by conditions in the product market, the presence of unions and management orientation.

We found general support for the hypothesis that market growth and predicability are positively associated with technological change, although other market variables, by and large, did not perform well. The consistent importance of market growth and market predicability accords with the principles of cost-benefit analysis and the neo-classical theory of the firm; investment is more likely when information regarding the future is more certain, and where future positive net benefits are more likely. In general however, market competition in both domestic and overseas contexts played, at best, a very minor role.

In all models, labour intensity was significant and had a negative impact on the odds in favour of technological change, suggesting that where labour made up a relatively large proportion of total cost, there seemed to be no attempt to alter the ratio in favour of capital. This finding appears to support the view put by Burgess that in Australia, the Accord in effect slowed down technological change because of a relatively slow growth in labour costs relative to costs overall (Burgess 1990: 7-9; see also Green 1992: 4).

Size was significant only in manufacturing sector, a finding that is not consistent with a number of overseas studies. As we pointed out at the beginning however, question ge1g permitted new technologies ranging from the smallest personal computer to massive manufacturing technologies. This explanation does not, however, account for the outcome in the manufacturing sector where workplace size was significant. Workplace age was significant, except in manufacturing; older workplaces were more likely to have reported technological change, but in

manufacturing workplace age appeared to have little bearing on whether or not technological change occurred.

As described earlier, there is a large body of literature concerned with the role of unions in the technological change process. Our results indicate that union presence had a significant and negative impact on technological change, a result that runs counter to the findings of a number of overseas studies of the role of unions in the process. While our models reveal a mixed picture of the relationship between technological change and union presence, any conclusion in favour of a definite positive relationship is not reflected in our results; nor was there any support for any proposition that the presence of several unions at a workplace made technological change less likely. What is not clear from the models developed here however, is precisely how the presence of unions operates to discourage change. The point has been made in fact that unions have not noticeably resisted technological change (Bamber & Lansbury 1990: 12), and as Willman has argued, perhaps it is more a case of some unions opposing some changes some of the time (Willman 1986: 247). In Australia, ACTU policy at least encourages conditional acceptance of technological change (ACTU 1985, 1991). At the same time, AWIRS data indicates that eighteen per cent of managers wanted to make 'technology or resources' changes, but felt unable to do so; thirteen per cent of workplaces felt they could not implement any changes (a variety of changes that included technological change) due to anticipated union opposition (Callus et. al. 1991: 339-40). It would be very useful to know more about how these management perceptions have worked to deter change; it may well be that what Willman has called 'the idea of resistance to change' (1986: 67) is an important factor inhibiting innovation. This is clearly an issue that warrants future investigation. All union variables other than union presence were insignificant or had signs contrary to those expected, and there was little evidence to support a view that union character influenced the probability of technological change. Union assertiveness, as proxied by the derived variable indicated the presence of an active union was not significant, and there was certainly no evidence to indicate that such unions inhibit technological change. Likewise, union density appeared to be irrelevant.

Variables indicating progressive management generally had positive effects on the probability of technological change; of some interest also was the finding that while new management generally had a strong and positive effect, changes in management structure appeared to have no relevance. However, the role of management in the technological change process has not been definitively unravelled in our models. While our results suggest that a management approach, which was in some sense of the word "progressive", had a strong and positive impact, we have some reservations about this conclusion. An obvious question begged is whether or not implementation of these practices necessarily implies a 'progressive' managerial stance, since they record particular practices implemented, rather than aspects of attitude or style. Nor is it entirely clear whether in some instances the survey reporting of technological change was simply a re-reporting of a management practice as in for example, the use of computer integrated management. (While it is not wholly reassuring, the technological change question did refer to a two year period, whereas the management practices questions referred to a broader five year period, suggesting perhaps that the two were perhaps separated; but it would have helped had the survey established how long the practices had been in place).

We have attempted to investigate technological change using a survey in which the issue of technological change was peripheral, and where the definition of the term

itself was left open to a range of interpretations. Perhaps because a number of earlier, more apocalyptic, visions of the impact of new technology on employment and work organisation have not been realised, or because change has apparently been accomplished without undue disruption, technological change as an industrial relations issue does not attract the same amount of attention at present as it did in the first part of the 1980s; perhaps attention has been diverted to other issues considered more urgent in contemporary Australian industrial relations. Yet the issue of technological change remains important for industrial relations reasons and, as well, because of the urgent need to improve Australia's international competitiveness. AWIRS provided a splendid opportunity to gather a great deal of insight into the technological change process in Australia. That opportunity was not seized, but future AWIRS will hopefully address the issue in a more comprehensive way.

## APPENDIX

Define  $O_i = \frac{p_i}{1 - p_i}$  so that  $\log(O_i) = \beta_0 + \beta_1 X_{i1} + \dots + \beta_k X_{ik} + \mu_i$

Let  $L_i = \log(O_i)$

Since  $L_i = \beta_0 + \beta_1 X_{i1} + \dots + \beta_k X_{ik} + \mu_i$  it is clear that for any change  $\Delta X_j$  in  $X_j$  the corresponding change in  $L_i$  is  $\Delta L_i = \beta_j \Delta X_j$ .

Setting  $\Delta X_j = 1$  yields  $\Delta L_i = \beta_j$  (that is, the change in the logarithm of the odds).

Define  $O_i^*$  such that for any  $\Delta X_j$ ,  $\log(O_i^*) - \log(O_i) = \beta_j \Delta X_j$ .

Now  $\log(O_i^*) = \log(O_i) + \log(\exp[\beta_j \Delta X_j]) = \log(O_i \cdot \exp[\beta_j \Delta X_j])$  so that  $O_i^* = O_i \cdot \exp[\beta_j \Delta X_j]$

Let  $\Delta O_i = O_i^* - O_i = O_i \cdot \exp[\beta_j \Delta X_j] - O_i = O_i \cdot (\exp[\beta_j \Delta X_j] - 1)$ .

It follows that the proportional change in the odds in favour is

$$\frac{\Delta O_i}{O_i} = \exp[\beta_j \Delta X_j] - 1 \text{ and when } \Delta X_j = 1 \quad \frac{\Delta O_i}{O_i} = \exp(\beta_j) - 1.$$

For example if  $p_i = 0.20$  then  $O_i = 0.25$ , and if  $\beta_j = 0.30$  and  $\Delta X_j = 1$  then

$\Delta L_i = 0.30$  and  $\frac{\Delta O_i}{O_i} = 0.35$ . The odds in favour increase by 35 per cent when  $X_j$

increases by one unit, other things being equal. This applies whether or not  $X_j$  is a (1,0) dummy variable. Since  $\exp(\beta_j) < 1$  for  $\beta_j < 0$ , it is clear that if  $\beta_j < 0$  then  $\frac{\Delta O_i}{O_i}$

$< 0$ .

## REFERENCES

- Angwin, M. (1991), 'Myths and Realities: A Review of the Australian Workplace Industrial Relations Survey', *The Economic and Labour Relations Review*, Vol. 2, No. 1: 57-71.
- Australian Council of Trade Unions (ACTU) (1985) *Technological Change Policy*, as adopted at the 1985 ACTU Congress, Melbourne. September.
- Australian Council of Trade Unions (ACTU) (1991), ACTU Policies and Strategies Adopted at the 1991 Congress, September.
- Australian Manufacturing Council (AMC) (1990), *The Global Challenge: Australian Manufacturing in the 1990s*. Final Report of the Pappas Carter Evans & Koop/Telesis Study. Australian Manufacturing Council, Melbourne.
- Bamber, G. and Lansbury, R.L. (eds) (1990), *New Technology*. Allen and Unwin, Sydney.
- Benvignati, Anita M. (1982), 'Interfirm Adoption of Capital-Goods Innovations', *The Review of Economics and Statistics*, Vol. 64: 330-35.
- Blackburn, R.H. (1976), *Union Character and Social Class. A Study of White Collar Unionism*. B.T. Batsford. London.
- Burgess, J. (1990), 'Another Productivity Paradox? The Accord and Recent Productivity Trends in Australian Manufacturing'. *ACCIRT Working Paper No. 3*, July.
- Business Council of Australia. (1989), *Enterprise-based Bargaining Units: A Better Way of Working*. Melbourne.
- Callus, R. (1991), 'The Making of the AWIRS', *The Journal of Industrial Relations*, Vol. 33, No. 4: 450-67.
- Callus, R., Morehead, A., Cully, M. and Buchanan, J. (1991) *Industrial Relations at Work*. AGPS, Canberra.
- Committee of Inquiry into Technological Change in Australia (CITCA) (1980) (Volume 1, R.H. Myers, Chairman), *Technological Change and its Consequences*, AGPS, Canberra.
- Crockett, G., Dawkins, P., Miller, P. and Mulvey, C. (1992), 'The Impact of Unions on Workplace Productivity in Australia', *The Australian Bulletin of Labour*, Vol. 18, No.2, 119-41.
- Daniel, W. W. (1987), *Workplace Industrial Relations and Technical Change*. Frances Pinter/Policy Studies Institute, London.
- Daniel, W. W. and Hogarth, T. (1990), 'Worker support for technical change', *New Technology, Work and Employment*, Vol. 5, No.2, 85-93.

- Davies, S. (1979), *The Diffusion of Process Innovations*, Cambridge University Press, Cambridge.
- Department of Industrial Relations. Australian Workplace Industrial Relations Survey, 1989-1990 (AWIRS) (1991) *Technical report and data release*. Canberra: Social Science Data Archives, The Australian National University [distributor].
- Department of Industrial Relations. Australian Workplace Industrial Relations Survey, 1989-1990 (1991), *Employee relations management questionnaire* [computer file]. Data collected by AGB: McNair. Canberra: Social Science Data Archives, The Australian National University [distributor]. One data file (2004 logical records) and accompanying user's guide.
- Department of Industrial Relations. Australian Workplace Industrial Relations Survey, 1989-1990 (1991), *General management questionnaire* [computer file]. Data collected by AGB: McNair, Canberra: Social Science Data Archives, The Australian National University [distributor]. One data file (2004 logical records) and accompanying user's guide.
- Drago, R., and Wooden, M. (1992), 'The Australian Workplace Industrial Relations Survey and Workplace Performance', *The Australian Bulletin of Labour*, Vol. 18, No. 2, 142-67.
- Freeman, R. B. and Medoff, J. L. (1984), *What Do Unions Do?* Basic Books, New York.
- Green, R. (1992), 'Analysis and Measurement of Productivity at the Workplace'. National Wages Policy and Workplace Wage Determination Conference, Melbourne. May.
- Latreille, Paul L. (1992), 'Unions and the Inter-Establishment Adoption of New Microelectronic Technologies in the British Private Manufacturing Sector', *Oxford Bulletin of Economics and Statistics*, Vol. 54, No. 1, 31-51.
- Lintner, V. G., Pokorny, M. J., Woods, M.M. and Blinkhorn, M. R. (1987), 'Trade Unions and Technological Change in the U. K. Mechanical Engineering Industry', *The British Journal of Industrial Relations*, Vol. 25, No. 1, 19-29.
- Machin, Stephen and Whadwhani, S. (1991), 'The Effects of Unions on Investment and Innovation: Evidence from WIRS', *The Economic Journal*, Vol. 101, 324-30.
- Machin, Stephen and Stewart, M. B. (1990), 'Unions and the Performance of British Private Sector Establishments', *Journal of Applied Econometrics*, Vol. 5, No. 3, 327-50.
- Millward, N., and Stevens, M. (1986), *British Industrial Relations: The DE/PSI/ACAS Surveys*. Gower, London.
- Moore, D. (1989), 'Industrial Relations and the Failure of the Accord: What Should be Done?', *Australian Bulletin of Labour*, Vol. , No. , 153-83.

- Plowman, D. (1991), 'Industrial Relations at Work: A Survey of the Survey', *The Journal of Industrial Relations*, Vol. 33, No. 4, 437-49.
- Romeo, A. A. (1977), 'The Rate of Imitation of a Capital-Embodied Process Innovation', *Economica*, Vol. 44, No. 1, 63-69.
- Senate Standing Committee on Science, Technology and the Environment (SSCSTE) (1987), *Technology Assessment in Australia*. AGPS, Canberra.
- Senate Standing Committee on Industry, Science and Technology (SSCIST) (1988), *Manufacturing Industry Revitalization: Making it Together*. AGPS, Canberra. September.
- Senate Standing Committee on Industry Science and Technology (SSCIST) (1990), *People and Technology: New Management Techniques in the Manufacturing Industry*. AGPS, Canberra. May.
- Stoneman, P. L. (1983), *The Economic Analysis of Technological Change*. Oxford University Press, Oxford.
- Tauman, Y. and Weiss, Y. (1987), 'Labor Unions and the Adoption of New Technology', *Journal of Labor Economics*, Vol. 5, No. 4, 477-501.
- Warner, M. (ed.) (1984), *Microprocessors, Manpower and Society*. St. Martin's Press, New York.
- Willman, P. (1986), *Technological Change, Collective Bargaining and Industrial Efficiency*. Oxford University Press, Oxford.

# The Determinants Of Investment In Training

A. M. Dockery

## INTRODUCTION

Under the Federal Government's "training guarantee" legislation, all employers with an annual payroll of over \$200,000 are required to spend at least 1.5% of their payroll on formal training, or else pay any shortfall to the government. The policy debate which culminated in this legislation seemed to accept, as a truism, that the level of investment in training by Australian industry is too low. Largely, this conclusion has been derived intuitively from a set of common casual observations - Australia's poor economic performance; international comparisons; the pace of technological change and the rate of (or need for) structural change. However, if one treats investment in training like any other economic investment, a concept well grounded in Human Capital Theory (HCT), there is little evidence that the level of training investment in Australia is too low.

Investment in training will be made by an economic unit as long as an adequate rate of return is made on that investment. The level of investment in training will therefore be determined by the interplay between the costs and the benefits of training, and how those costs and benefits are shared between economic units. True, the pace of technological and structural change are important factors influencing these variables. However, an efficient labour market should deliver the optimal level of investment in training given a set of environmental factors, or rate of change in those factors. If it is believed the level of investment in training is not optimal, it would seem that policy should be directed at the workings of the labour market, not the symptom.

This paper argues that the level of investment in training by Australian industry, be it optimal or otherwise, is significantly influenced by the labour market structures in which firms operate, and which operate within firms. Part 2 provides overviews and a refinement of the recent training debate in Australia. Part 3 reviews the major economic theories relating to training, the Human Capital Theory and internal labour market theory, and Part 4 investigates some of the limited existing Australian data.

In Parts 5 to 7, data from the Australian Workplace Industrial Relations Survey (AWIRS) is used to more formally identify the determinants of training investment in Australian workplaces, and the characteristics of labour markets which influence

the efficiency of the Australian system of skills formation. Concluding comments are provided in Part 8.

## AUSTRALIAN POLICY PERSPECTIVES ON TRAINING: AN OVERVIEW

Many of the earlier approaches to training policy in Australia focussed on equity issues. A primary aim of training policy was to reduce inequalities between socio-economic groups through the public provision of training to those facing labour market disadvantages. Since the early 1980's, training policy has become increasingly concerned with the importance of skills formation in international competitiveness and economic growth. As the focus has shifted, the need for Australia to increase its expenditure on education and training significantly has become apparent to all and sundry (see, for example, the publications of DEET, the National Training Council and ASTEC).

Three basic streams of reasoning have underpinned this conclusion. Firstly, shortages of skilled labour persisted in the Australian labour market despite continued high levels of unemployment. Secondly, the pace of technological and structural change will increase the demand for skills and, thirdly, Australian expenditure on education and training lags behind higher performing economies. Although each is intuitively appealing, it is difficult to find compelling evidence or logic to suggest that Australian industry would improve its performance by increasing training expenditure.

The impact of technological change on skill formation is in fact ambiguous, creating increased demand for skills on the one hand, and a deskilling effect in many productive processes. This led Curtain et al (1986) to argue that the essence of a skill formation system lay in its flexibility. DEET's position, however, was unambiguous - "There is wide agreement on both the inadequacy of the present national training effort and the importance of quality training to meet the needs of structural adjustment and ongoing technological change" (1988: Executive Summary).

Even if we accept that technological change will bring greater demands for skills, the logical conclusion is only that there will be greater need for education and training, not that current or future levels will be too low. Accordingly, DEET admits that expenditure by Australian private sector firms on formal training seemed to increase during the 1980's (1988:9). No skill formation system could cost effectively keep pace to supply exact skill needs as they fall due. If institutionalised arrangements exist in Australia to cause under-investment in training, then this will occur irrespective of the pace of technological change. While technological or structural change may well exacerbate associated problems, it is neither cause nor proof of under-investment.

The persistence of skill shortages, even during times of high unemployment, is seen as further evidence of the need for increased training. Dawkins (1987) noted that skill shortages are most severe for highly skilled and experienced workers and extended to the graduate level in a number of industries and professions. ASTEC (1987a) pointed to the low proportion of Australians with tertiary degrees compared to other industrial countries and the shortage of mathematics, science

and computer education within the workforce. With Australia's education system being predominantly a public one, the problem here would appear to lie in the government's own spending on education or in their ability to forecast the skill needs of the economy.

The level of training is, of course, only one of the determinants of the state of the labour market for a certain skill. Oft cited cases of skill shortages, such as the metal trades, largely relate to occupations characterised by high wastage rates (see Thomas 1989:194). It is possible that the return to higher skills embedded in industrial awards, often largely beyond the control of employers, is simply too low. Clearly, employers may be better served by creating a wage differential for skilled workers than providing more training.

The logical converse of the skill shortages argument is to point to the typically large pool of unemployed persons, many of whom are skilled, as evidence that investment in training is too large in Australia. The existence of both skill shortages and over-supplies would suggest either simple frictional imbalances or, if these are unusually severe, faults in the allocative mechanisms of our skill formation system, including wage rigidity and the government's education policy, rather than any fault in the level of investment in training.

The conclusion that Australia's investment in training is inadequate is most commonly drawn from evidence that expenditure on education and training is low by international standards. Stromback and Moy are particularly critical of the use of international comparisons - "Economic analysis of policy costs and benefits appears to have lost currency among policy makers. Instead international comparisons have become the centrepiece of the argument that private industry's training effort is below the desirable level" (1989a:112). The most widely quoted figures are contained in the following table prepared by the BLMR, although their validity has been strongly questioned (Stromback, Moy 1989a).

**TABLE 1: ESTIMATES OF EXPENDITURE ON EDUCATION AND TRAINING IN FOUR OECD COUNTRIES (% OF GNP, 1980)**

Country	Public	Private	Total
Australia	6.0	1.2	7.2
USA	7.2	1.5	8.7
Japan	5.9	1.9	7.8
West Germany	5.2	2.1	7.3

Source: Curtain, Krbavac, Stretton 1986:13.

ASTEC drew on this data to emphasise the lack of expenditure on private education and training (1987c: 6). The government is less timid in pointing the accusing finger - "... while government contributions to training in Australia have been broadly in line with the experience of our trading partners, the contribution of private industry continues to be considerably less" (Dawkins 1987:70). And this despite the admission that data on training expenditure is collected regularly only in the United States and France, and that training activity in Australia appeared comparable to that in France but lower than that in the US (DEET 1988:68).

Stromback and Moy (1989a:112) argue that even if the link between education and training and economic growth was empirically established, this is not sufficient basis for policy action. High average returns to education and training do not mean that there will be high returns at the margin, and it is at the margin that decisions to increase investment in training must be taken. Further, Australia's training level is typically compared to its major trading partners when in fact Australia competes with other primary producers and resource rich nations. "The appropriate comparison, if any, is to compare the level and development of human capital in Australia's primary industries with those in countries such as Brazil and Argentine. We have not undertaken that comparison but speculate that it would be favourable to Australia" (Stromback, Moy 1989a:113).

### Refining the Argument

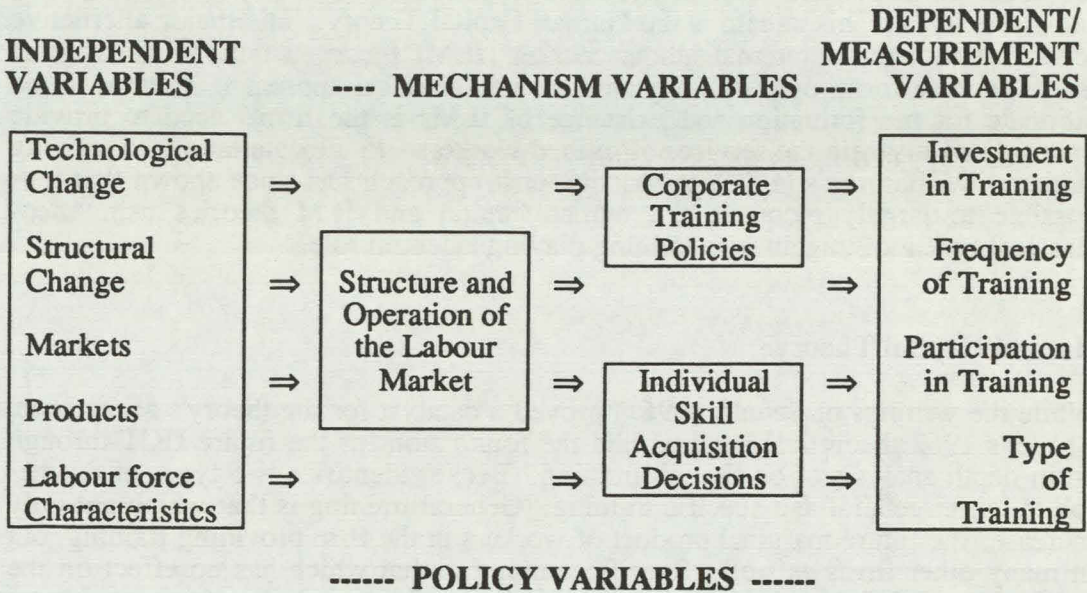
Even if one accepts that greater investment in training will improve workers' efficiency, that investment must still compete with alternative uses of capital, including investment in new technology, employing additional workers etc. For the purposes of allocative efficiency the criterion is, quite simply, that when all costs and benefits are included, an acceptable rate of return must exist to justify an investment in training.

Unfortunately, the great difficulty in quantifying the costs and benefits of training prohibits such a direct approach. It is not difficult, however, to refine the argument considerably. A necessary (but not sufficient) condition for an economically optimal level of investment in training, is that all training investments for which marginal benefits exceed marginal costs be undertaken<sup>1</sup>. It can be assumed that under perfect market conditions this criterion will hold. Market imperfections are therefore one possible source of under-investment in training. In the case of training, the relevant imperfections will ultimately pertain to the labour market.

The Australian economy may also be inefficient in providing training, such that there are fewer profitable training investment opportunities than would be the case with a more cost efficient skills formation system. Alternatively, the returns to training investors may be suppressed, as would occur if social returns to training are greater than the returns to the private investor. It has been argued that the rate of labour turnover in Australia prevents individual firms benefiting from their investments in training their own workers. This is more fully discussed in Part 4.2. Again, each of these relates to the way in which the labour market operates.

The determination of training investments may best be summarised in the following diagram. (Acknowledgement to Dinkelspiel's (1981:99) diagram of The Corporate Training System).

<sup>1</sup> When the expected rate of return is included in the calculation of marginal costs and benefits, this criterion is, of course, the equivalent to the realisation of all possible rates of return higher than the expected rate of return on capital.



"Proof" of under-investment in training and education in Australia has been derived from either the independent variables or the measurement variables. The first of these is clearly misdirected and the latter holds little meaning without giving due consideration to the system's mechanisms. Being generous, one could say that government policy, as embodied in the training guarantee, has targeted corporate training policies. More realistically, it has targeted the measurement variables and lies outside what I consider to be legitimate policy area.

### TRAINING AND LABOUR MARKET THEORY

Pure neo-classical labour market theory has been dogged by three commonly observed phenomena. In apparent contradiction to the theory, all industrial countries have experienced periods of sustained involuntary unemployment; wages often do not equate to marginal product, as evidenced by the tendency of firms to retain workers despite downturns in product demand; and marked wage differentials exist between industries and between individual firms within industries for observably like workers doing similar jobs<sup>2</sup>.

Labour economics faced two alternatives. One was to expand the neo-classical model to account for these observed phenomena. The second was to reject the neo-classical model and develop alternative theories of the functioning of labour markets. The contributions made by theorists following both paths have focussed heavily on the role of training and training needs as being major determinants of the structure and operation of labour markets.

Neo-classicists showed that if training was treated as any other investment in capital, then its incorporation into labour market theory could account for many of

<sup>2</sup> The classic example is Dunlop's comparison of 1953 hourly wage rates for motor truck drivers in Boston, ranging from \$1.27 for transporters of scrap metal, to \$2.49 for transporters of magazines (1957:135).

the apparent anomalies without the need to deviate from normal neo-classical analytical tools. This stream is the Human Capital Theory. The major alternative school of thought is internal labour market (ILM) theory which, in its original Institutional form, outrightly rejected the neo-classical approach. Central to the rationale for the formation and existence of ILMs is the firm's need to provide training and to retain the services of trained workers - to allocate labour to training ladders. Williamson's (1975) transaction cost approach has since shown that it is possible to largely reconcile the human capital and ILM theories using neo-classical type tools, again with training playing a central role.

### Human Capital Theory

While the writings of Schultz (1961) proved a catalyst for the theory's acceptance, Becker's 1962 theoretical analysis laid the foundation for the future HCT through an in-depth analysis of on-the-job training. Becker identifies two types of on-the-job training; general and specific training. General training is that which not only increases the future marginal product of workers in the firm providing training, but in many other firms as well. Specific training is that which has no effect on the productivity of trainees other than in the home firm, and therefore would not increase the wage the trainee could receive on the open labour market.

Labour and capital will be used in the training process, thus reducing output and raising expenditure during the training period; that is, an investment is made in training. In an efficient labour market the wage rate of a worker who receives general training would increase to equate to the higher marginal product and a firm providing general training could not recoup any of the return on that investment.

Becker's answer to this problem was that firms would provide general training only if employees pay for the cost of their training by receiving wages below their marginal product during the training period. They are willing to do so because, post-training, they will receive higher wages than they would have had there be no training - the return on their investment. In the case of education, the trainee pays not only the costs associated with studying, but also the foregone potential earnings (opportunity cost) for the duration of their education.

In the case of specific training, firms must bear the costs as a rational employee would not pay for training that offered no personal benefit. Except in the firm providing the training, the employee's marginal productivity will everywhere be that which he could have produced pre-training. In a perfect market, the employee's wage will equal the marginal product of the worker before training. For the firm providing specific training the post-training marginal product of the worker will exceed the worker's wage and this is how the firm recoups the investment. The firm both makes the investment and receives the returns.

Therefore, HCT tells us that firms will be prepared to bear all the costs of specific training but will be unwilling to bear any of the costs of general training. In reality training is unlikely to be either completely specific or completely general, but will consist of varying degrees of both specific and general components. Relaxing this dichotomy Becker states "the fraction of costs paid would be negatively related to the importance of the general component, or positively related to the specificity of the training." (Becker 1962:20)

## HCT and the Perfect Market Assumption

The effect of specificity on the training financing decision is considerably simplified here through the assumption of perfect markets. This assumption has been challenged as unrealistic for a range of reasons:- union bargaining power and non-pecuniary benefits of training or education (Eckaus 1968); recruitment costs and other causes of labour immobility (Ziderman 1978); the inefficient contracting arrangements implicit in wage bargaining implicit in the open market (Williamson *et al* 1975); relative wage rigidity and the ability of training institutions to respond to changes in demand for particular courses or training (Curtain 1986).

By considering labour supply and demand decisions to be a function of not just the money wage, but the "full wage" incorporating both the money wage and the value of training provided by the employer, Hashimoto (1982) demonstrates that a set minimum wage reduces investment in training in two ways. Firstly, a reduction in training occurs as a side effect of reduced employment. Secondly, those who remain employed at wages near the minimum wage experience a reduction in training. Sloan (1987:70) has found some evidence that such an effect is present in Australia.

Becker's diagnosis that workers will pay for general training (including education) assumes that individuals will have access to capital to finance this training whenever such investments are profitable. If the cost of capital is lower for firms than for individuals, it will be economic for more of the costs and benefits of training to be borne by the firm. If such an adjustment is not made, capital market imperfections may well lead to a less than optimal level of investment in training.

Becker's assumption of perfect markets, however, does not render the theory useless. Oatey contends that as long as it can be assumed that general trainees can be paid less than the going rate for doing some skilled work and that a specifically trained worker is more likely to get higher wages in the firm to which his skills relate than elsewhere, then the theory has plausibility for the real world. The assumption of perfect labour mobility can be dropped by distinguishing between the generality of the skills as defined with respect to the training content, and the generality of the training investment on the basis of labour mobility. The financing of training in general skills can become a specific investment under conditions of low labour mobility, as in the case of Japanese firms' life time employment policies (Oatey 1970).

While the real world, as always, has proven not to be as pure as the theory, the general HCT has won widespread acceptance due to its strong explanatory power. In particular, the theory has been able to account for a substantial part of the variance in income between socio-economic groups and the slope of the average age-earnings profiles over the working lives of these groups (Becker 1975).

## Internal Labour Markets (ILM)

The difficulties faced by the human capital theorists in finding support for their analysis of specific and general training caused many to look to the alternative school of thought - the theory of internal labour markets. Writers generally cite Kerr (1954) as the founder of this approach and the theory has been considerably

advanced by Doeringer and Piore (1971).

In the formation of the ILM, Kerr emphasised the effects of the preferences and prejudices of unions and employers in developing the institutional rules which govern recruitment and internal allocation, and which work to limit competition, reduce labour mobility and determine wages. Under this early approach the ILM was therefore generally seen as inefficient (see Creedy and Whitfield 1988:253). In contrast, Doeringer and Piore saw the internalisation of the labour market as a process arising out of attempts to increase the allocative efficiency of the labour market. They define the ILM as:-

"an administrative unit, such as a manufacturing plant, within which the pricing and allocation of labor is governed by a set of administrative rules and procedures..." that is "...distinguished from the external labour market of conventional economic theory where pricing, allocating and training decisions are controlled by economic variables."  
(Doeringer and Piore 1971:1-2)

The ILM is generated by three factors: skill specificity, the importance of on-the-job training and custom (Doeringer & Piore 1971: Chapter 2). Skill specificity raises the cost of training to the employer by increasing the proportion of costs borne by the employer, and by increasing the absolute cost of such training, for the less common a skill is in the labour market the less scope there is for the realisation of economies of scale in providing training for that skill. Custom arises from workers' regular contact with one another under conditions of stability of employment, resulting in the formation of social groups within the ILM. This leads to a common perception of fairness and equity which then forms the informal rules governing allocation and wage determination.

Given these factors, Doeringer and Piore explain the formation of ILMs through their value to the worker, the reduction in the cost of labour turnover and the technical efficiencies in recruiting, screening and training. Firstly, employees value the security of employment and the fairness and equity embodied in the administrative rules, and hence will accept lower wages given their worker quality. Labour turn-over is reduced, allowing the firm more opportunity to benefit from investments in training and to limit the recurrence of recruiting, screening and training costs. Training on the job is also made more efficient because other workers are willing to impart knowledge to trainees, since their own employment is not under threat from graduating trainees. The training process can be further improved by designing promotion ladders to compliment skill accumulation.

Consequently a labour market structure develops which is characterised by stability of employment; restriction of entry to a limited number of ports of entry; the filling of higher positions by internal promotion; a heavy emphasis on seniority in promotion; wages attached to jobs rather than workers, and determined by administrative rules rather than economic variables.

Adjustments for changes in the demand for labour are therefore not made simply via changes in the relative wage rate as under the wage competition model. Adjustment in the ILM is made via the creation of vacancies at the ports of entry, the use of overtime or subcontracting, changes in recruitment and promotion practices or changes in training arrangements. Only over the long term can the customs and administrative rules, which determine wage relativities between jobs,

be changed.

A notable facet of Doeringer and Piore's analysis is that they expressly reject the wage competition model. The HCT and ILM theories, however, need not be mutually exclusive. Extensions to HCT have largely reconciled the alternative approaches to the extent that they are virtually equivalent in terms of empirical predictions (See Creedy and Whitfield 1988). Perhaps the most accepted of these reconciliations and worthy of note here is the theory of transaction costs.

Williamson et al. (1975) develop the concept of ILMs through analysing the efficiency of the different forms of contract between employer and employee. In particular, the continual renegotiating of "spot contracts", as implied in a wage competition model of the labour market, is shown as inherently inefficient once the assumption of perfect markets is removed. They argue that ILMs promote consummate cooperation between workers and those in positions of authority, unlike other forms of the authority contract. Wages are attached to jobs rather than individuals, preventing opportunistic bargaining and the hoarding of idiosyncratic knowledge, and internal promotion ladders enable the firm to reward cooperative behaviour. Contract renewal and revision are undertaken in an atmosphere of mutual constraint and individuals will not opportunistically conceal information relevant to the bargaining process.

Under this approach, greater weight is afforded to the reduction in the costs of transactions and of "bounded rationality" (uncertainty) in the employment contract. It does not reject the basic tenets of HCT.

### APPLICATION OF THE THEORY AND SOME EXISTING EVIDENCE

There is strong empirical evidence of the existence of the forces envisaged under HCT (Mincer 1974; Becker 1975; Miller 1990) and of labour markets structured in accordance with general ILM theory (Alexander 1974; Nowak & Crockett 1983; Norris 1984; Creedy & Whitfield 1988). However, due largely to the scarcity of relevant empirical evidence there have been few efforts to correlate labour market structures with training effort. Hence our knowledge of the relationship between the labour market structures of Australian firms and their training investment is limited.

Curtain cites studies by Norris and by Maglen and Daly to argue that the relative importance of occupationally based labour markets, as opposed to enterprise ILMs, has suppressed in-firm training in Australia compared to the US and Japan (1986:39). Krbavac and Stretton (1988:11) argue that this has been accentuated by Australia's occupationally based award system which makes it difficult to restructure work processes. Hence firms try to adapt their labour needs to the occupational markets determined by the award structure.

Both Miller's analysis of the Australian Longitudinal Survey and the employer based data of the Australian Bureau of Statistics' Training Expenditure Survey (TES) have found considerable variance in the provision of training across industries (yet, to my knowledge, no attempt has been made to explain even these differences). The TES also highlights the greater provision of training by the public sector. The 1989 survey reported that 79% of private employers spent

nothing on formal training compared to 39% of public employers.

### Training and Economies of Scale

The employer based data of the TES reveals little difference in the percentage of gross wages and salaries spent on external training by small and large firms (as measured by the number of employees), but a strong positive relationship between employer size and the provision of in-house training. This would suggest that significant economies of scale exist for the provision of in-house training. The cost of sending an employee to TAFE or to a tertiary institution should, *ceteris paribus*, be the same for small and large firms. In contrast, the average cost of training an employee in-house should fall with the number of employees trained, particularly where the firm has to initially establish a formal training function and facilities.

Paradoxically, total training expenditure per training hour, assumed here to be a proxy for unit training costs, actually increases with size (ABS Cat. No. 6353.0 1990: Table 2). This is explicable by the assumption that in-house training is considerably more expensive than external training, but also offers a greater return (and an equivalent or greater rate of return on training investments). The increase in hourly training costs with firm size is then attributable to a greater incidence of in-house training provision among large firms.

The available training cost data precludes us from claiming with certainty that economies of scale for in-house training do exist due to the possibility that it is benefits that are positively correlated to firm size. However, it would be difficult not to expect the provision of in-house training to conform closely with the neo-classical theory of the firm's production costs. Either case implies the existence of *returns to scale* for in-house training investments.

### Australian Labour Markets and Turn-over: The Poaching Theory

A major distinguishing feature of labour market structures is that external labour markets are expected to have higher labour turn-over, meaning investments in the training of individuals by the firm may not be fully recouped. The other side of the coin is that the firms which recruit trained employees will reap the rewards of another's investment in human capital. This phenomenon has become known as "poaching" and is given as one of the prime rationales for the imposition of a training levy in Australia.

DEET (1988:12) states "... it is generally recognised that some firms provide little or no training and rely on attracting skilled workers from firms that do train. Training firms effectively subsidise poaching firms; training firms cannot realise the full value of their investment and are therefore discouraged from training." As Krbavac and Stretton note, this will exclude the provision of training for which the internal benefits are less than the costs to the firm, but the overall social gains exceed the costs (1938:38).

Ziderman (1978:42) dismisses the poaching theory saying "Since, by definition, employers have little interest in recruiting workers with skills specific to other firms, the poaching phenomenon is confined to generally trained workers; yet this

does not impose losses on the training company since ... it is the trainee not the firm that finances training of a general type."

However, in ILMs, or using Oatey's redefinition of generality of investment from that dependent upon the skills to that defined with respect to the mobility of trainees, it is recognised that firms will bear some of the cost of general training and will be hurt by the departure of a trained employee. The firm may account for this by obtaining a sufficiently large return from those remaining, or may reduce turn-over by offering some of the return from training to the employee:-

"When the final step is completed firms no longer pay all training costs nor do they collect all the return but they share both with employees. The shares of each depend upon the relation between quit rates and wages, lay off rates and profits ..." (Becker 1962:20)

Consequently, where firms bear some of the cost of general training, the proportion of the costs borne by the firm will be inversely related to turn-over. Poaching firms will have to pay higher wages to attract employees from training firms. To the extent that this is done, and labour turn-over is increased, more of the training costs will be borne by the trainee, probably through lower wages during training. In an efficient market the effects of such action would be neutral, and may well increase efficiency if some firms have a comparative advantage in providing training.

Again market imperfections will hinder the arbitrage process. Potential trainees are unlikely to know the effect of various training options on their future earnings or their future labour market behaviour in terms of turn-over. A second impediment is that trainee wages are largely determined externally to the firm. According to Sloan "On the evidence, it would appear that the pay gradient for trained workers in Australia is too flat - too high in the initial phase and too low later on." (1987:70). This prevents the firm transferring the cost of training to the trainee when faced with poaching or labour turn-over. The firm may instead take action to reduce the supply of training.

Thomas' 1989 study revealed a high proportion of turn-over in Australian labour markets due to workers leaving the occupation in which they are trained. Separation rates from "home" occupations exceeded 50% in 17 of the 31 categories studied. Hence turn-over is more likely to be due to the low return to training investments - the flatness of the earnings profile - than poaching, and largely an exogenous variable for the firm. Stromback and Moy point out that high turn-over may mean that the level of training is actually above the social optimum because of the continued need to retrain new workers. If turn-over could be reduced, conceivably the economically optimal level of investment in training could be lower than the current level. Similarly, increasing the level of training, without addressing the rate of labour turn-over, is highly likely to be an uneconomic allocation of resources.

In summary, it can be accepted, as in the early literature, that high turn-over rates reduce the return to investment in training. The higher the exogenously determined level of labour turn-over, the lower will be firm's *ceteris paribus* investment in training. However, on the weight of evidence it is difficult to ascertain that poaching significantly reduces the level of training. Turn-over may be more a result of the flat earnings profiles than poaching by other firms, and there is no

evidence that firms do not optimise investments given the inherent rate of turn-over they face. Hence it is doubtful that training firms "subsidise" non-training firms and that increased training, without addressing turn-over, would not result in wasted resources.

## EXISTENCE AND EFFECTS OF INTERNAL LABOUR MARKETS

The above review of existing evidence and data offers some encouragement for the approach of analysing the determinants of training investment through labour market theory. The available information is, however, clearly limited and does not permit a rigorous analysis. By constructing indicators of firms' labour market structures and their provision of general and specific training from AWIRS, such an analysis is possible.

At a fundamental level, the theory developed to date can be restated as follows. Training and education, be it general or specific, is an input into the firm's production process. Firms can acquire general skills in three ways:- 1) they can be purchased from the open labour market by employing individuals who have invested in general training; 2) they can provide current employees with general training in return for the acceptance of lower trainee wages; or 3) they can provide general training to their employees by creating ILM structures which will enable the firm to collect the benefits of training over the duration of employee's tenure.

Generally speaking, economies of scale either do not exist or are very weak for the provision of external training by individual firms, and thus the provision of external training should be independent of firm size. Specific skills must be provided to employees by the firm. Where specific skills are important, firms need to develop ILM structures to economise the training process and to protect their investments in this training. Considerable economies of scale exist in the provision of specific training and therefore the provision of specific training is positively associated with firm size. Existing evidence suggests the provision of training to be greater in the public sector.

AWIRS asked employers whether or not the organisation provided non-managerial employees a) with paid study leave or offered financial assistance for study in the past year; and b) with any formal program of instruction designed to develop employees' skills in the last year. It would be safe to assume that the provision of study assistance represents the provision of general training. A formal program of instruction (for convenience, also referred to here as "workplace training") may contain both specific and general components, but is likely to be of significantly greater specific nature than external study. On a comparative basis it is therefore possible to interpret workplace training as specific training and studies assistance as general training.

The first step is to test whether labour market structures exist and operate as predicted by labour market theory. Because the dependent (training) variables are binary choice variables, a logit model is used. The basic model to be estimated is:-

$$P(t) = f(\text{SIZE}, \text{Sector}, \text{LMS}).$$

That is, the probability of a workplace providing training is a function of the scale

of workplace operation, the sector of the organisation and the workplace's labour market structure. More specifically, the labour market structure is to be measured by indicators of the existence of internal labour markets.

Separate logit models were run to test the probability of firms providing workplace training (Table A1.1) and of firms providing paid study leave or financial assistance for study (Table A1.2). The exact specifications of all variables are contained in Appendix 4. The variable SIZE is included in the model as a three level continuous variable based upon the number of employees working at or from the workplace. The categories range from 50 or less employees; between 51 and 150 employees; and greater than 150 employees.

AWIRS permitted workplaces to be classed as either PUBLIC, PRIVATE or OTHER and this inevitably led to an indecipherable coefficient on the OTHER variable. In any case, it is not the fact that a workplace is government owned which leads us to expect that it will provide a higher level of training, but rather the absence of market discipline. Two other constructs are available to capture this effect. Workplaces could be classified as either "Commercial" or "non-commercial", allowing the inclusion of a dichotomic dummy variable COMMRC. Managers were also asked to rate the intensity of competition for their product or service and a continuous variable COMPTN, ranging from 0 (no competition) to 3 (intense competition), was constructed from the response.

Three different constructs are used to capture the ILM effect and each is modelled separately. ILM1 is a dummy variable which takes on the value of 1 (as opposed to zero) when the workplace satisfied all the following criteria: offered security of employment; a high degree of internal promotion to management levels; a low level of turnover; and employee wages or numbers are not influenced by short term fluctuations in economic conditions.

ILM2 also has a value of zero for workplaces which do not offer security of employment or whose employee wages or numbers are influenced by short term fluctuations in economic conditions. For the remaining workplaces the degree of internal promotion and turnover were used to construct an index of the strength of the ILM structure, allowing ILM2 to be modelled as a continuous rather than dummy variable. Finally, the separate components of the ILM structure were retained as individual variables in the equation - security of employment (SECEMP), turnover (TURNOVER), the degree of internal promotion (INTPROM) and the presence of wage competition (WCOMP).

The AWIRS questionnaire does not provide a satisfactory construct to model the number or level of ports of entry to the workplace's labour market. Given that the restriction of entry to a small number of ports at the lower level of promotion ladders is an important aspect of ILM theory, this represents a definite limitation to the model, though the effect is likely to be partially captured by the other ILM variables.

## Results

The results, reported in Tables A1.1 and A1.2 of Appendix 1, are consistent with the hypothesised relationship between labour market structures and training. Firm

size, the public sector and, most importantly, ILM structures were found to be positively associated with firm provision of training.

In each equation the coefficient on the SIZE variable is large, positive and significant at the 99% confidence level, indicating that larger firms are far more likely to offer either workplace training or study assistance. The positive effect of size appears just as strong on the probability of the firm providing study assistance. This was not expected as economies of scale should be weak or non-existent in the case of external studies and may suggest that greater returns, as well as lower costs, can be derived from scale.

Alternatively, some of this apparent relationship may be accounted for by the limited measure of training provision. Simply through having a larger number of employees, and likely a wider range of occupations, there is a greater chance of large firms having an employee receiving studies assistance. With a measure such as the percentage of employees receiving this training, or dollars invested per employee, the relationship may not have been present. If, for example, one in fifty of all employees receive study assistance and these are randomly distributed across all firms, larger firms will be more likely to be found to provide study assistance.

Equations 1, 4 and 7 of each table reveal that public sector workplaces, after allowing for size and labour market structure, are more likely to provide training. Likewise, commercialism and higher levels of competition are associated with a lower likelihood that workplaces will provide training. The sector effect is notably stronger in the case of study assistance. Thus public sector workplaces are more liberal in their provision of training and particularly of general training.

In theory, firms should not provide general training unless (a) they have developed ILM structures to internalise the return to training; or (b) employees pay for the training by accepting lower wages. Given that one model standardises for the existence of an ILM (ILM1) and another for the strength of the ILM (ILM2), then consistency with optimal training investment policies would require, *ceteris paribus*, the second of the above options to be true of public workplaces. Casual empiricism would suggest that this is not the case.

Given also that the COMMRCL and COMPTN variables can equally be used to capture the sector effect, these results may raise the suspicion that higher training provision associated with the public sector is due to uneconomic training policies as opposed to some failing on the side of private employers. The *ceteris paribus* assumption is, however, a strong one. The differences in training provision between the sectors will also be influenced by sectoral differences in the many factors which effect the efficiency and return to training, including the cost of capital and, as is discussed later, trainees' own demand for training.

Both the dummy ILM1 variable and the measure of the strength of the ILM structure, ILM2, were found to be positively associated with the probability of a workplace providing training, generally with a high significance level. Where the individual ILM components were included, coefficients had the expected sign in all equations with the exception of the wage competition variable, WCOMP, in the equations modelling the provision of workplace training. The probability of a firm providing workplace training was found to be positively associated with the workplace offering security of employment and an emphasis on internal promotion. In the case of workplace training, the rate of turnover and security of employment

appear to have a similar (though opposite) effect in modelling the ILM structure. However the SECEMP variable proved the superior specification and TURNOVER was dropped from the equation.

In the case of study assistance SECEMP was positively associated and TURNOVER was negatively associated with firm provision, and when modelled simultaneously both were significant at the 99% level. This would suggest a greater importance of labour stability in firms' decisions to provide general training than in decisions to provide specific training; and is consistent with our predictions from the theory. This finding is also supported by the greater relative size of the coefficients on ILM2 compared to the coefficients on the ILM1 in the case of the provision of study assistance.

A major rationale for the development of ILMs is their effect on the efficiency of the training process. Where workers face a set career path tied to a path of skills formation under administrative-type arrangements, they are more willing to gain skills and to impart information, thus improving the efficiency of the training process. However, the firm's ability to influence the efficiency of the training process is primarily limited to workplace training, with the efficiency or cost of the training processes involved in external study predetermined.

Consequently, we would expect a strong correlation between internal promotion and the provision of workplace training, but not between internal promotion and the provision of study assistance. Accordingly, INTPROM was positive and significant at the 99% level in the case of workplace training. In the case of study assistance it was near zero and insignificant, and the variable was dropped from Equations 7 - 9 in Table A1.2.

The positive relationship of wage competition with the provision of workplace training does not fit in with the theory. Wage competition was assumed to be present if the firm indicated that it would decrease wages in the event of a fall in demand for their product or service, or *increase wages* in the event of an increase in demand. Further testing revealed that if WCOMP was only ascribed to firms which indicated they would *decrease wages*, then the coefficients did have the predicted sign. It may be argued that this would be a better specification.

### INSTITUTIONAL EFFECTS ON TRAINING INVESTMENT

The major finding of the previous section is that ILMs do appear to exist in Australian industry and display the positive relationship with training investment predicted in economic theory. Distinguishing between general and specific training, the results are further consistent with the theory that firms develop ILMs to internalise the return to training and, in the case of specific training, to improve the efficiency of the training process. Yet still being unable to estimate the potential returns to training investments, it is impossible to argue that the optimal level of training is or is not being provided. There are, however, a number of other factors which may influence the level of training provision of firms in such a way to allow us to draw efficiency implications.

Theory would suggest, for example, that minimum wage legislation and capital market imperfections adversely effect the provision of training. The presence of

negative associations between such factors and the level of training would imply a divergence from optimal training provision. For other factors, such as the presence of trade unions, economic theory is less clear cut in the predicted effect on training, and it is the direction or even existence of an association itself in which most interest lies.

Building on the models in Equations 2 of tables A1.1 and A1.2, as these have the practical advantage of using the least number of variable categories, AWIRS allows us to test for the existence of some of the claimed causes of under-investment in training in Australia. The model is extended to take the form:-

$$P(t) = f(\text{SIZE}, \text{COMMRCL}, \text{ILM1}, X)$$

where X represents the range of additional factors to be tested. Additional factors are included to test the effect of unions, industrial awards, measurement of labour productivity, the number of workplaces in the larger organisation, nationality of the firm and the existence of performance payments. Ideally all factors would be included simultaneously, however the nature of logit models, the sample size and computing practicalities preclude this. It should be noted, then, that the existence or effect of any correlation between the independent variables may not be detected. Checks have been made where there are grounds to expect that such a correlation may exist.

## Results

Tables A2.1 and A2.2 present the results for the provision of workplace training and study assistance, respectively. Equation 1 in each table reproduces the results of the basic model and Equations 2 to 8 incorporate the additional factors, discussed in turn below. It should be remembered throughout the discussion that the effect of the variable is being tested after allowance is made for the workplace's size, sector and internal labour market structure.

### *The Effect of Unions*

The productivity effects of unions is a contentious issue. Evidence from Britain and the USA suggests that unions operate to increase the wages of their members and impose a net social loss of output (Norris 1989:146-149). Following Hashimoto (1982), union imposition of minimum or even higher wages may potentially reduce training provision.

Other approaches argue that, by decreasing labour turnover, unions in fact promote cost efficiency (eg. Miller & Mulvey 1989) and this approach would predict that unions would be associated with higher levels of firm provided training. Implicit contract theory stresses the higher risk averseness of workers as opposed to firms. Unions may therefore attempt to increase the level of specific training invested in their members, making it more expensive for employers to retrench workers in response to downturns in demand. Greater general training may increase members' chances of finding another job in the event that they did become unemployed, however one would expect the risk "averseness" effect of unions to be greatest in the case of specific training. Such effects, however, should be manifest in the labour market structure itself, rather than in the model tested here which is

designed to standardise for labour market structures.

The presence of unions was found to have no significant effect upon either workplace training or study assistance. The reported variable UNION models the effect of "any union having members here". The union effect was also tested using a variety of other constructs and in all cases the coefficients were near zero and insignificant. The union variables were tested both separately and simultaneously with the variable measuring award coverage, with virtually identical results.

The absence of any evidence of a union effect may be because unions have conflicting effects on training at different workplaces, just as the various theories are in conflict; or indeed unions may have no institutional effect. These findings do not dismiss the more likely proposition that unions influence the workplace's labour market structure rather than directly inputting into the firm's training investment decisions.

### *Industrial Awards*

Under HCT the existence of minimum wage legislation, or for that matter any institutional wage setting, is expected to reduce training opportunities for employed workers by preventing workers purchasing training through lower wages. Awards in Australia generally contain minimum wage clauses for given occupational groups, often specifying the wage differentials for given levels of skill and experience.

The coefficient on AWARDCOV - the degree of award coverage in the workplace's largest occupation - was negative and significant at the 95% level for both general and workplace training. This is consistent with the hypothesis that institutionalised wage settings suppress training provision. One may argue that the AWARDCOV variable is acting as an indicator of the generality of skills, and is therefore associated with a lower level of firm provided training. However, the fact that the effect is similar in the case of study assistance, which is by design general training, is then left unexplained.

### *Measurement of Labour Productivity*

Given the difficulty in measuring the returns to training, firms may err on the side of caution in their training investment decisions. A major component of the calculation of costs and benefits of training is labour productivity; pre-training, during training, post-training and "experienced worker standard". The variable MEASURE was included to capture the effect of firms which measure labour productivity as opposed to those which don't. The above hypothesis would dictate that where firms can (and do) measure labour productivity, they will be more likely to provide training. Unfortunately, one could well dispute the direction of causality - a firm which provides training may then be more disposed to measure labour productivity.

Table A2.1 reveals that MEASURE does indeed have a significant positive association with the likelihood of a workplace providing a formal program of instruction. Table A2.2 shows no significant relationship exists in the case of study assistance.

While the findings relating to workplace training do support our original proposition, they invite a myriad of other explanations. Compatibility with two other common theories is noteworthy. Firstly, if we assume that in the case of the general training workers both pay for and reap the rewards in line with HCT, firms would conceivably have no interest in measuring associated changes in labour productivity. Even if study assistance was found to increase productivity, the firm has no incentive to increase this form of training as they receive no net benefit, and no association would thus be expected. The firm will, however, be concerned with the productivity effects of the training which it finances, for their investment is to be recouped through higher post-training labour productivity.

Secondly, proponents of the screening hypothesis would argue that education has little effect on productivity, serving mainly as a screening device to identify desirable characteristics in individuals. Assuming this to be the case, the absence of a significant relationship between firms measuring labour productivity and the provision of study assistance would again be predicted - the employer does not expect increased productivity from this investment, just greater information about employees.

#### *Number of Similar Workplaces in Organisation*

If a workplace was part of a larger organisation containing other workplaces with similar skill needs, economies of scale, in addition to those which can be exploited at each workplace, would be likely to exist for some training resources. Further, the more such workplaces in the organisation, the greater the scope to achieve economies of scale. The potential benefits of workplace training may also increase, with greater scope to use specific skills which are, by nature, otherwise only of use in the workplace in which they are gained. No such cost advantages should exist for external training, for an organisation with multiple like workplaces is no better situated to exploit general skills than any single workplace.

The continuous variable WORKPLCS was included as a measure of "the number of workplaces in this organisation which undertake similar or related activities to this one". As predicted, the variable is positively and significantly associated with the provision of workplace training, but unrelated to study assistance. It is difficult to conceive explanations other than the scale advantages discussed above which would fit these findings.

#### *Nationality*

There is a common perception that Australian management has a poor approach to training, among other personnel management matters. The AWIRS data reveals that for workplaces which were not single establishments, having their ultimate head office in Australia (HOAUST) as opposed to overseas reduced the likelihood they would provide training. Similarly, FOROWN, which measures the degree of foreign ownership of the workplace, was positively associated with training provision. In each case, the effects were similar for both workplace training and study assistance, and significant at the 99% level.

Unless one is to argue that Australian management practices are actually economically superior to those of other countries, these findings would suggest that the level of training provision in Australian companies is less than optimal. One

may expect that a company of international scale would be more conducive to training provision, however, this would ultimately be due to cost or return advantages. Such explanations would fail to account for the similar relationship present in the case of study assistance. The workplace and external dichotomy to date has been well behaved in cost-related tests of the theory, and this would tend to reinforce concerns about Australian management's attitudes toward training.

### *Payment Structure*

Equations 7 of Tables A2.1 and A2.2 show that PERFPAY - a dummy variable indicating firms in which non-managerial employees receive payments based on some measure of performance - is positively and significantly associated with the likelihood of the firm providing workplace training, but unassociated with the likelihood of the firm providing study assistance. A possible explanation for this finding is that payment structures based on performance give the firm greater scope to finance training through paying lower wages during the training stage, perhaps a further indication that institutional wage settings suppress training provision in Australia.

An alternative, although not mutually exclusive, explanation is that payments based on performance make the benefits of training more apparent to workers, increasing their own demand for training and thus the efficiency of the training process. The effect of the degree of internal promotion in the workplace (INTPROM), discussed in Part 5.1, also suggested that such supply-side factors may have a significant impact upon training provision, presumably by affecting the rate of return to training investments. The exogenous determination of the cost of study assistance, or the assumption that workers fully pay for general training, would then suggest that performance payments should not influence the provision of this form of training. This is supported empirically.

The results on PERFPAY and MEASURE are similar if the two variables are modelled simultaneously.

### *Skill Composition*

The final equations of Tables A2.1 and A2.2 incorporate two continuous variables used to describe the nature of the skills of each workplace. The variable EWS measures the time taken for a new employee to work to the standard of other employees (experienced worker standard) in the largest occupational category. The variable GENERAL is simply derived from the occupation of the workplace's largest occupational category, postulating that this can be used as a measure of the level of general skills. The general skill level was considered highest where the largest occupational group was managers or professionals, followed by para-professionals and trades, and finally the groupings of clerks, sales and personal service workers and labourers were taken to imply the lowest general skill level.

EWS is, unfortunately, open to a number of interpretations. It may be a measure of the skill level or experience of existing employees, or it may be a measure of the degree of difficulty of the work. Where longer periods are required to reach EWS, the workplace's skill requirements are likely to be of a specific nature and the variable may even be taken as a proxy of demand for specific skills. If it measures the experience of existing workers, then it may also act as an inverse measure of

turnover. In each scenario a strong correlation should exist between this variable and ILM variables, and this is explored further Section 7.

The results show that EWS is positively associated with the provision of both workplace training and study assistance, while GENERAL has an affect only in the case of study assistance. The inclusion of EWS notably reduces the effect of ILM1, suggesting that EWS is correlated with, or partly measures, the ILM effect. However, both remain significant and EWS may also be a good measure of specific skill demand. The outcomes for GENERAL are as expected; it has no discernible relationship with workplace training and is positively associated with study assistance.

## THE RESPONSIVENESS OF LABOUR MARKET STRUCTURES

The results so far suggest that Australian firms do develop ILM structures and that these structures are associated with higher levels of training. But how effective are these adjustments in providing the optimal level of training investment? A shortfall of training investment will still occur if labour market structures are not as responsive to training needs as perfect market conditions would dictate. Put simply, labour market rigidity, one of the most commonly flagged ailments of the Australian economy, has the potential to significantly suppress training investment in the economy; and indeed create a divergence of the level of training investment from that which would be optimal under conditions of greater labour market flexibility.

Internal labour market theory sees the ILM structure developing as an efficient response to economic forces from both the supply and demand side. Firms with high specific skill needs must finance training for their employees, and need to develop ILMs to economise the training process and to prevent the loss of those investments. General skill formation is most efficiently achieved in training institutions and firms with high general skill requirements are more likely to purchase these skills from the open labour market.

In reality the skill requirements of firms will be a mixture of general and specific skills, and there will be a spectrum of optimal labour market structures ranging from complete employee financing of training to complete firm financing; and from unstructured labour markets to ILMs. What needs to be shown is that ILM structures are positively associated with specific skill needs or investments and unassociated, or evenly negatively associated, with general skill needs<sup>3</sup>.

As the efficiency of the training process is improved through the attainment of economies of scale, one might also expect to find a positive relationship between the existence of ILMs and the size of firms. The development of an internal labour market structure within a firm may therefore be described by the model:-

$$\text{ILM1} = f(\text{SIZE}, \text{EWS}, \text{GENERAL}, \text{X})$$

where X represents a range of other institutional variables which influence the

<sup>3</sup> Note that a negative association between general skill needs and the formation of ILMs is not inconsistent with firms which have developed ILMs being more likely to provide general training.

responsiveness of labour market structures to skill needs, and the other variables are as defined previously. EWS can be taken either as a measure of the specific skill requirements inherent in the firm's production process, or the level of human capital investment in the specific training of the existing employees. Under either interpretation, the coefficient on EWS is expected to be positive. The sign of the coefficient on SIZE is also expected to be positive, while the coefficient on GENERAL may be zero or negative.

## Results

With ILM1 being able to take on values of 1 and 0 only, a logit model was again run with the results presented in Table A3.1. Few of the overall models are significant, despite the results for individual variables, indicating that much structuring of the labour market within firms remains unexplained. However, the coefficients on the major variables remain relatively stable and significant throughout the analysis.

### *The Development of the ILM*

The basic model supports the assumption that ILMs develop in response to skill needs and investments. All variables pass the usual tests of significance, and the signs of the coefficients on SIZE and EWS are as expected. ILM structures are positively associated with firm size and specific skill needs or investment. The coefficient on GENERAL is quite strongly negative, indicating that where the firms' employees carry with them larger investments in general training (or education), ILM structures are less likely to develop. This may be because the firm opts for an unstructured labour market, keeping open its access to the general skills available on the open labour market; or because such employees are reluctant to enter into the "implicit contracts" inherent in ILMs, believing larger returns to their investment in human capital may be obtained on the wider market.

Note that while GENERAL is negatively associated with the likelihood of the firm developing an ILM structure, Part 6.1.7 revealed that it is positively associated with the likelihood of the firm providing study assistance. This offers further evidence that general training, while received through the firm, is in fact paid for by the employees, probably through lower wages. Were this not so, the firm would be making an investment in general training, and then adopting a labour market structure which works to prevent it recouping the return to that investment - hardly rational economic behaviour.

### *Unions and Labour Market Structures*

Unions can be seen either as institutions which assist in the formation of ILMs or, in contrast, which try to protect the returns to general skills by attaching the worker to occupational groups rather than the workplace. Commentators have argued that Australia's industrial framework emphasises the importance of occupational based labour markets at the expense of ILMs (see Part 4.0).

Some conflicting results arise from the empirical evidence. UNIONCOV, the degree of union coverage of the workplace's largest occupational group, is positively associated with the likelihood of the firm developing an ILM structure.

Testing (not reported) also indicated that both a) if the firm was unionised rather than non-unionised; and b) the number of unions having members at the firm; are positively associated with ILM structures.

However, closer inspection revealed a more complicated picture. Firms in which only one union had members (SINGLEU), were less likely to develop ILMs than firms with no unions at all. Yet firms in which more than one union had members (MULTIU), were more likely to have ILM structures compared to the no union reference variable. A check with more union categories showed that the presence of 2 only unions also increased the likelihood of an ILM structure being present compared to the absence of unions.

The picture which emerges is that unions suppress the development of ILM structures if, and only if, a single union has members at the workplace. To help explain this paradoxical finding the basic model was run separately on the sample of firms with only a single union (Equation 4) and on the remaining sample (Equation 5). The results are less robust in Equation 4, as would be expected from the smaller sample size. However some of the sources of the SINGLEU effect can be seen. Most notably, the level of general skills is strongly and positively associated with the development of ILM structures in single union firms, quite the opposite to the relationship in other firms. It is possible, therefore, that in single union firms, the employer bears more of the cost of general skill acquisition.

Of course not all unions are alike. Some are trade based, some industry based and others enterprise based. The inclusion of more specific union related variables may prove more successful. This said, one theory is tentatively put forward. The union variables may actually be measuring union bargaining power, with a single union indicating the greatest degree of bargaining power. The absence of unions, of course, would be associated with less bargaining power and both the number of unions and the size of the employing firm would indicate lower bargaining power for any one union, thus explaining the correlated effect of MULTIU and SIZE. One could then conjecture that greater bargaining power is used by unions to obtain the desirable properties of ILM structures, such as security of employment and internal promotion - seemingly at the expense of the firm's access to the open market for general skills.

### *Award Coverage and Labour Market Structures*

While award coverage was found in Part 6 to be associated with lower levels of training provision, Equation 6 of Table A3.1 indicates that AWARDCOV is actually conducive to the development of ILMs. This does not support the notion that the award structure leads to occupational based labour markets and the significance and strength of the positive relationship does not sit well with any of the theoretical approaches. It is possible that many award conditions are actually similar to ILM characteristics, in which case some association of award coverage with the ILM variable would result.

### *Labour Costs and Labour Market Structures*

Theory would predict that the higher labour costs as a component of the firm's total costs, the greater the comparative benefits of creating ILM structures. The coefficient on LABCOST in equation 7 of Table A3.1 shows that higher labour

costs are indeed associated with a higher probability of the firm developing an ILM. Separate models were again run on the sample of firms which estimated labour costs to comprise 60% or less of total costs, and the sample of firms which estimated labour costs to comprise greater than 60% of total costs. The results are reported in Equations 8 and 9.

The behaviour of EWS is relatively consistent in each case. For the sample of low labour-cost firms, the SIZE variable has a weaker effect. For the sample of high labour-cost firms the GENERAL variable becomes near zero and insignificant, and the significance of the overall model drops markedly. These findings suggest that where labour costs are high, the benefits of ILMs outweigh the potential gains of keeping the firm open to the market for general skills. Returns to scale in the development of ILMs appear to be stronger where labour costs are a greater portion of total costs; and this would follow if one considers that larger firms would have greater scope for providing promotional structures. For low labour-cost firms, the benefits of size would more likely be derived from scale economies in the use of capital such as plant and machinery, rather than in the organisation of the labour market.

### *Nationality and Labour Market Structures*

While firms with foreign head offices were previously found to offer a higher level of training, the results of Equation 10 show that firms with domestic head offices are, in fact, more likely to form ILMs. This can not be taken, however, to imply more efficient practices in Australian firms. Models were run separately on the samples in each of the "head office" categories. A comparison of Equations 11 and 12 show that the labour markets of firms with foreign head offices are more responsive to both SIZE and EWS. This greater responsiveness to relevant economic variables would tend to suggest that the practices of foreign firms are more likely to lead to optimal labour market structures on efficiency grounds.

## CONCLUSION

The debate surrounding the Federal Government's Training Guarantee legislation provided the genesis of this paper. If above normal social returns to investments in training do exist, the market economist intuitively asks why private economic agents do not already make these investments. Where has the market failed? Certainly, one would expect these questions to be answered before intervention could be justified. While I have no blind faith in the market, the training debate in Australia seems to have paid insufficient attention to these issues.

While labour market theory has much to offer an analysis of the determinants of investment in training, the analysis of training investments equally has much to contribute to contemporary labour market theory. However, prior to the availability of AWIRS, our understanding of the relationship between the labour market characteristics of individual firms and their training investment decisions has been extremely limited.

The most important empirical contribution of this paper is to demonstrate, at a statistically significant level, the existence of ILM structures and their positive association with firm provision of training in accordance with ILM theory. Both

the existence of an ILM within a firm and the strength of the ILM, measured by the degree of internal promotion and labour stability, is shown to be positively correlated with training provision. Strong support is also found for the HCT's distinction between general and specific training and who pays for each form of training. In particular, it is shown that the development of ILMs is positively associated with the firm's level of specific skill needs/investment, but negatively associated with general skill needs, as would be predicted by HCT.

It could not be claimed with confidence that institutional factors which suppress economic investment in training have been identified. However the empirical results do contribute to the body of evidence on a number of issues:-

- # The consistency of most of the results with labour market theory of training provision, and the responsiveness of training provision to cost related factors indicates that training decisions in Australian firms are primarily based upon economic efficiency criteria. There is no evidence that this is less so in the private sector. In fact, a case to the contrary could be put.
- # The effects of award coverage and performance payment systems on the provision of general and specific training are consistent with the theory that wage rigidity reduces the level of investment in training.
- # Unions primarily influence the labour market structure of firms rather than the level of training directly given the firm's labour market structure. This influence is concentrated on the way in which the labour markets of firms adjust to general skill needs. The behaviour of the union variables suggests that further analysis of the training and labour market effects of different types of unions, and of the degree of union power, may be instructive.
- # International firms appear to be more conducive to the provision of both general and specific training, supporting the view that Australian management has a generally negative approach toward training. While Australian firms are more likely to form ILM structures, their labour market structures are less responsive to economic variables, and this would not seem to imply economic efficiency.
- # There is some indication that the difficulty in quantifying the return to training investments induces a shortfall in training from that which would occur in conditions of greater certainty.

The analysis reveals, in a number of instances, the importance of supply side factors, something which has also largely been ignored in Australia's training debate. While the existence of economies of scale in the provision of training is to be expected, it appears that larger firms are also able to derive greater benefits in addition to cost reductions. The results also suggest that employee's desire or demand for training may also considerably improve the efficiency of the training process.

A policy implication of this is that it may be training attitudes of workers, as much as employers, which need to be revised in Australia. If workers were made to pay more of the costs of training and also share in more of the benefits, the efficiency of the skills formation system, and therefore the overall level of investment in training may rise significantly. This presents a further case for greater wage flexibility.

The development of ILMs was found to be significantly suppressed by higher general skill needs. A personal feeling was that this effect would not be so pronounced. Remember also the finding that the effect of unions is primarily to influence the responsiveness of labour market structures to general skill needs, and Thomas' (1989) evidence of separation from skilled occupations for generally trained workers. The system of general skill accumulation is also subject to a high level of government intervention. If Australia's skills formation system does contain any major peculiarities, there is a good chance that these lie in the labour market for general skills, and this provides a possible avenue for further research.

A final contribution, however, relates to methodology. Measurement difficulties associated with collecting training data have resulted, to date, in a paucity of empirical research above the case study level. This analysis has been carried out on a data base not specifically designed for the purpose, and containing few questions relating to training provision. Further, the nature of the dependent variables severely limits the possible econometric treatments. The results indicate that the difficulty in quantifying training investments, costs and benefits need not be the barrier to research in training that the current state of the economic literature would suggest.

## APPENDIX 1

Table A1.1 Probability of Firm Providing Workplace Training

Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	-0.537# (0.001)	-0.362* (0.018)	-0.256 (0.114)	-0.785# (0.000)	-0.671# (0.000)	-0.547# (0.000)	-0.733* (0.022)	-0.697* (0.028)	-0.628^ (0.052)
SIZE	0.662# (0.000)	0.671# (0.000)	0.685# (0.000)	0.650# (0.000)	0.656# (0.000)	0.673# (0.000)	0.663# (0.000)	0.671# (0.000)	0.683# (0.000)
Sector:-									
OTHER	-0.223 (0.111)	-	-	-0.214 (0.126)	-	-	-0.1842 (0.194)	-	-
PRIVATE	-0.223# (0.002)	-	-	-0.269# (0.001)	-	-	-0.206* (0.017)	-	-
COMMRCL	-	-0.352# (0.000)	-	-	-0.357# (0.000)	-	-	-0.293# (0.000)	-
COMPTN	-	-	-0.190# (0.000)	-	-	-0.190# (0.000)	-	-	-0.154# (0.000)
ILM1	0.207# (0.009)	0.265# (0.001)	0.245# (0.002)	-	-	-	-	-	-
ILM2	-	-	-	0.152# (0.001)	0.181# (0.000)	0.167# (0.000)	-	-	-
ILM3:-									
SECEMP	-	-	-	-	-	-	0.234# (0.000)	0.250# (0.000)	0.254# (0.000)
INTPROM	-	-	-	-	-	-	0.226# (0.000)	0.272# (0.000)	0.276# (0.000)
TURNOVER	-	-	-	-	-	-	-	-	-
WCOMP	-	-	-	-	-	-	0.512^ (0.062)	0.531^ (0.053)	0.516^ (0.061)
L-hood Ratio	21.23*	9.56	34.33*	37.55	19.39	51.07	82.04*	56.45^	102.34*
D.o.F.	12	8	20	30	20	44	60	43	80
Probability	(0.047)	(0.297)	(0.024)	(0.162)	(0.497)	(0.216)	(0.031)	(0.082)	(0.047)
n	2003	2003	1999	1987	1987	1983	1997	1997	1993

# significant at the 99% level.  
 \* significant at the 95% level.  
 ^ significant at the 90% level.  
 (Probabilities given in parenthesis).

Table A1.2 Probability of Firm Providing Study assistance

Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	-0.594# (0.000)	-0.447# (0.004)	-0.209 (0.201)	-0.780# (0.000)	-0.708# (0.000)	-0.438# (0.004)	-0.109 (0.733)	0.101 (0.751)	0.271 (0.402)
SIZE	0.727# (0.000)	0.736# (0.000)	0.758# (0.000)	0.706# (0.000)	0.712# (0.000)	0.737# (0.000)	0.674# (0.000)	0.675# (0.000)	0.697# (0.000)
Sector:- OTHER	-0.088 (0.542)	-	-	-0.076 (0.596)	-	-	-0.090 (0.537)	-	-
PRIVATE	-0.460# (0.000)	-	-	-0.457# (0.000)	-	-	-0.383# (0.000)	-	-
COMMRCL	-	-0.469# (0.000)	-	-	-0.473# (0.000)	-	-	-0.406# (0.000)	-
COMPTN	-	-	-0.311# (0.000)	-	-	-0.311# (0.000)	-	-	-0.269# (0.000)
ILM1	0.149^ (0.060)	0.222# (0.005)	0.191^ (0.054)	-	-	-	-	-	-
ILM2	-	-	-	0.157# (0.000)	0.192# (0.000)	0.172# (0.000)	-	-	-
ILM3:- SECEMP	-	-	-	-	-	-	0.167# (0.000)	0.190# (0.000)	0.184# (0.001)
INTPROM	-	-	-	-	-	-	-	-	-
TURNOVER	-	-	-	-	-	-	-0.348# (0.000)	-0.395# (0.000)	-0.377# (0.000)
WCOMP	-	-	-	-	-	-	-0.118 (0.631)	-0.093 (0.704)	-0.111 (0.652)
L-hood Ratio	30.37#	22.81#	55.33#	49.80*	34.75*	79.85#	112.13#	92.03#	147.04#
D.o.F.	12	8	20	30	20	44	58	43	81
Probability	(0.002)	(0.004)	(0.000)	(0.013)	(0.021)	(0.001)	(0.000)	(0.000)	(0.000)
n	2000	2000	1996	1985	1985	1981	1991	1991	1987

# significant at the 99% level.

\* significant at the 95% level.

^ significant at the 90% level.

(Probabilities given in parenthesis).

## APPENDIX 2

Table A2.1 Institutional Effects on the Probability of Firm Provision of Workplace Training

Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-0.362* (0.018)	0.072 (0.776)	-0.384* (0.013)	-1.080# (0.000)	0.640 (0.105)	-0.371* (0.016)	-0.258 (0.102)	-1.206# (0.000)
SIZE	0.671# (0.000)	0.669# (0.000)	0.658# (0.000)	0.673# (0.000)	0.586# (0.000)	0.653# (0.000)	0.662# (0.000)	0.694# (0.000)
COMMRCL	-0.352# (0.000)	-0.357# (0.000)	-0.381# (0.000)	-0.277# (0.000)	-0.766# (0.000)	-0.405# (0.000)	-0.405# (0.000)	-0.326# (0.000)
ILM1	0.265# (0.001)	0.271# (0.001)	0.264# (0.001)	0.222# (0.005)	0.220# (0.008)	0.274# (0.000)	0.272# (0.000)	0.231# (0.004)
UNION	-	0.070 (0.332)	-	-	-	-	-	-
AWARDCOV	-	-0.167* (0.026)	-	-	-	-	-	-
MEASURE	-	-	0.160# (0.003)	-	-	-	-	-
WORKPLCS	-	-	-	0.211# (0.000)	-	-	-	-
HOAUST	-	-	-	-	-0.232# (0.004)	-	-	-
FOROWN	-	-	-	-	-	0.149# (0.000)	-	-
PERFPAY	-	-	-	-	-	-	0.146# (0.008)	-
EWS	-	-	-	-	-	-	-	0.311# (0.000)
GENERAL	-	-	-	-	-	-	-	0.021 (0.785)
L-hood Ratio	9.56	75.39*	19.69	81.63#	16.22	33.39	29.55*	146.26*
D.o.F.	8	56	19	52	15	30	18	119
Probability	(0.297)	(0.043)	(0.413)	(0.005)	(0.368)	(0.306)	(0.042)	(0.046)
n	2003	1982	2003	2003	1717	2000	2003	1985

# significant at the 99% level.

\* significant at the 95% level.

^ significant at the 90% level.

(Probabilities given in parenthesis).

**Table A2.2 Institutional Effects on the Probability of Firm Provision of Study Assistance**

Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-0.447# (0.004)	-0.062 (0.809)	-0.438# (0.005)	-0.411* (0.032)	0.046 (0.800)	-0.456# (0.003)	-0.426# (0.008)	-1.789# (0.000)
SIZE	0.736# (0.000)	0.733# (0.000)	0.743# (0.000)	0.737# (0.000)	0.626# (0.000)	0.719# (0.000)	0.734# (0.000)	0.779# (0.000)
COMMRCL	-0.469# (0.000)	-0.487# (0.000)	-0.459# (0.000)	-0.474# (0.000)	-0.482# (0.000)	-0.517# (0.000)	-0.480# (0.000)	-0.383# (0.000)
ILM1	0.222# (0.004)	0.221# (0.005)	0.222# (0.004)	0.224# (0.004)	0.201* (0.014)	0.230# (0.003)	0.223# (0.004)	0.173* (0.029)
UNION	-	-0.021 (0.778)	-	-	-	-	-	-
AWARDCOV	-	-0.181* (0.017)	-	-	-	-	-	-
MEASURE	-	-	-0.064 (0.248)	-	-	-	-	-
WORKPLCS	-	-	-	-0.011 (0.753)	-	-	-	-
HOAUST	-	-	-	-	-0.283# (0.000)	-	-	-
FOROWN	-	-	-	-	-	0.134# (0.002)	-	-
PERFPAY	-	-	-	-	-	-	0.029 (0.602)	-
EWS	-	-	-	-	-	-	-	0.371# (0.000)
GENERAL	-	-	-	-	-	-	-	0.217# (0.006)
L-hood Ratio	22.81#	94.27#	32.83*	107.21#	37.31#	74.03#	36.49#	162.07#
D.o.F.	8	56	19	52	15	30	18	119
Probability	(0.004)	(0.001)	(0.025)	(0.000)	(0.001)	(0.000)	(0.006)	(0.005)
n	2000	1979	2000	2000	1717	1997	2000	1982

# significant at the 99% level.

\* significant at the 95% level.

^ significant at the 90% level.

(Probabilities given in parenthesis).

## APPENDIX 3

Table A3.1 Probability of Firm Developing an ILM Structure

Equation	(1)	(2)	(3)	(4) 1 Union	(5) Other	(6)
Intercept	-3.636# (0.000)	-3.962# (0.000)	-3.509# (0.000)	-5.196# (0.000)	-3.091# (0.000)	-4.582# (0.000)
SIZE	0.384# (0.000)	0.311# (0.000)	0.204* (0.028)	0.474^ (0.067)	0.271# (0.004)	0.367# (0.000)
EWS	0.535# (0.000)	0.508# (0.000)	0.525# (0.000)	0.465^ (0.064)	0.556# (0.000)	0.540# (0.000)
GENERAL	-0.248* (0.013)	-0.212* (0.042)	-0.336* (0.024)	0.436^ (0.081)	-0.398# (0.000)	-0.182^ (0.078)
UNIONCOV	-	0.233# (0.001)	-	-	-	-
NUNIONS SINGLU	-	-	-0.336* (0.024)	-	-	-
MULTIU	-	-	0.585# (0.000)	-	-	-
AWARDCOV	-	-	-	-	-	0.307* (0.025)
L-hood Ratio	38.62	136.21	116.78*	25.09	40.02	90.26
D.o.F.	32	128	92	29	32	95
Probability	(0.195)	(0.293)	(0.042)	(0.674)	(0.156)	(0.618)
n	1985	1940	1985	448	1537	1964

(continued)→

Table A3.1 Probability of firm Developing an ILM Structure (Cont'd)

Equation	(7)	(8) LABCOST 0 - 60%	(9) LABCOST > 60%	(10)	(11) Aust HO	(12) Foreign HO
Intercept	-3.824# (0.000)	-2.905# (0.000)	-4.250# (0.000)	-3.680# (0.000)	-3.153# (0.000)	-4.979# (0.000)
SIZE	0.386# (0.000)	0.174 (0.244)	0.526# (0.000)	0.362# (0.000)	0.312# (0.001)	0.570# (0.006)
EWS	0.527# (0.000)	0.564# (0.000)	0.532# (0.000)	0.520# (0.000)	0.466# (0.000)	0.749# (0.000)
GENERAL	-0.316# (0.003)	-0.447# (0.000)	-0.034 (0.818)	-0.266# (0.008)	-0.266* (0.015)	-0.263 (0.292)
LABCOST	0.101* (0.026)	-	-	-	-	-
HOAUST	-	-	-	0.278# (0.002)	-	-
L-hood Ratio	185.55	47.08*	30.80	78.21	45.73^	29.81
D.o.F.	176 (0.296)	32 (0.042)	32 (0.527)	67 (0.164)	32 (0.055)	32 (0.578)
n	1985	658	1291	1985	1459	526

# significant at the 99% level.

\* significant at the 95% level.

^ significant at the 90% level.

(Probabilities given in parenthesis).

## APPENDIX 4

### Analytical Constructs

**A4.1 Size** - AWIRS asked managers how many employees are on the payroll and currently working at or from this workplace, including casual and part time employees, but not contractors, agency workers or outworkers. The SIZE variable was determined on the basis of the manager's response, R:-

if $0 < R < 51$	then SIZE = 1;
if $50 < R < 151$	then SIZE = 2;
if $150 < R$	then SIZE = 3.

**A4.2 Sector** - Managers were asked to indicate which of the following categories best described their workplace:

1. private sector;
2. government business/commercial statutory authority;
3. non-commercial statutory authority;
4. public service department;
5. other non-commercial;
6. other commercial.

Workplaces were classified as PRIVATE if the response, R, was 1; PUBLIC if R was 2, 3 or 4; and OTHER if R equalled 5 or 6.

COMMRCL was assigned a value of 1 if R = 1, 2 or 6 and 0 if R = 3, 4 or 5.

For workplaces in which the manager responded that there were other competitors for their major service or product, the manager was further required to rate the degree of competition (R) on a scale of 1 (limited) to 6 (intense). If there were no other competitors the COMPTN was assigned a value of 0. For others the variable was assigned a value of

1 if R = 1 or 2;
2 if R = 3 or 4;
3 if R = 5 or 6.

**A4.3 ILM1** - is a dummy variable taking on the value of 1 if an ILM structure exists and 0 otherwise. All workplaces were assigned an ILM1 of 0 if any one or more of the following responses R were given to the questions below, and 1 otherwise.

(a) Is security of employment provided by this employer for the majority of employees who work here?

R = "no";

(b) Approximately what percent of managers here were appointed to their current positions from within this organisation?

R < 51;

(c) What percent of all employees have worked here for more than 5 years?

R < 26;

(d) What would be your most immediate response to a substantial increase in demand for your product or service?

R = "Increase the remuneration of employees";

(e) What would be your most immediate response to a substantial decrease in demand for your product or service?

R = "Decrease the remuneration of employees", or  
R = "Decrease the number of people employed";

(f) (Where relevant) What was the main reason for reducing the size of the workforce in the last year?

R = "Wages too high";

(g) (Where relevant) In occupational groups in which you had the most difficulty in attracting suitable applicants, which one method was the most successful in filling vacancies?

R = "Offered higher wages or conditions".

**A4.4 ILM2** - is modelled as a continuous variable ranging from 0 for workplaces with no or very weak ILM structures to 3 for workplaces with strong ILM structures. The exclusion conditions A4.3(a), A4.3(d) and A4.3(e) are retained to give ILM2 a value of 0 for workplaces satisfying those conditions. For remaining workplaces the value of ILM2 was assigned depending upon the stability of the workforce and the degree of internal promotion (INTPROM). Workforce stability (STABILITY) is ascribed according to the manager's estimation, R, of the percentage of employees who had worked at the workplace for more than 5 years:-

if R = 0	then	STABILITY	=	0;
if 0 < R < 11	then	STABILITY	=	1;
if 10 < R < 26	then	STABILITY	=	2;
if 25 < R < 51	then	STABILITY	=	3;
if R > 50	then	STABILITY = 4.		

INTPROM is assigned according to the manager's estimation, R, of the percentage of managers who were appointed to their current positions from within the organisation:-

if R = 0	then	INTPROM	=	0;
if 0 < R < 26	then	INTPROM	=	1;
if 25 < R < 76	then	INTPROM	=	2;
if R > 75	then	INTPROM = 3.		

ILM2 is then defined by:

$$\text{ILM2} = \text{Integer}[(\text{INTPROM} + \text{STABILITY})/2]$$

such that ILM2 can assume only whole number values from 0 to 3.

**A4.5 ILM3** - Individual variables were included in the model to capture the effect of individual labour market characteristics relevant to ILM structures - security of employment (SECEMP), internal promotion (INTPROM), labour turnover (TURNOVER) and the presence of wage competition (WCOMP).

INTPROM is included as specified in A4.4. The value of TURNOVER is specified by the manager's estimation, R, of the percentage of employees who had worked at the workplace for more than 5 years:-

if R < 11	then	TURNOVER	=	3;
if 10 < R < 51	then	TURNOVER	=	2;
if R > 50	then	TURNOVER	=	1;

SECEMP and WCOMP are dummy variables. SECEMP takes on a value of 1 if the manager indicated that the employer offers security of employment for the majority of employees and 0 otherwise. WCOMP is included to model the effect of the openness of employment to wage competition from outside workers. It assumes a value of 1 if either of the responses R were given to the following questions and 0 otherwise:-

What would be your most immediate response to a substantial increase in demand for your product or service?

R = "Increase the remuneration of employees";

What would be your most immediate response to a substantial decrease in demand for your product or service?

R = "Decrease the remuneration of employees".

**A4.6 AWARDCOV** - For each occupational group (see A4.10) at the workplace, managers were asked to estimate whether none, some, most or all of the employees in that group were covered by awards. AWARDCOV took on a value of 0, 1, 2, or 3 respectively for the response for the largest occupational group at the workplace.

**A4.7 WORKPLCS** - For workplaces which are "single establishments", the variable WORKPLCS took on a value of one. For others the value related to the manager's response to the question "throughout (Australia/this state/territory [depending on which was relevant]), how many workplaces are there in this organisation that undertake similar activities to this one?". If:-

R = 2 - 5,	then WORKPLCS = 2;
R = 6 - 10,	then WORKPLCS = 3;
R = 11 - 50,	then WORKPLCS = 4;
R > 50,	then WORKPLCS = 5.

**A4.8 FOROWN** - if the workplace's ownership status was given as:-

Wholly Australian owned,	then FOROWN = 0;
Predominantly Australian owned (51% or more),	then FOROWN = 1;
Equally 50% Australian, and 50% foreign owned,	then FOROWN = 2;
Predominantly foreign owned (51% or more),	then FOROWN = 3;
Wholly foreign owned,	then FOROWN = 4.

**A4.9 EWS** - (continuous variable) in reference to the largest occupational group at the workplace, managers were asked "on average how long does it take a new employee to work the same standard expected of other employees in that job classification?" If the response given was:-

Less than one week	EWS = 1;
In between a week and 3 months	EWS = 2;

In between 3 months and a year	EWS = 3;
Over a year	EWS = 4.

**A4.10 GENERAL** - Managers were asked to indicate the largest occupational group at the workplace out of the following

1. Managers;
2. Professionals;
3. Para-professionals;
4. Tradespersons;
5. Clerks;
6. Sales and personal service workers;
7. Plant and machine operators and drivers; or
8. Labourers and unskilled workers.

Depending on the response, R, values were ascribed to the continuous variable GENERAL as follows:-

If R = 1 or 2,	then General = 3;
If R = 3 or 4,	then General = 2;
If R > 4,	then General = 1.

**A4.11 UNIONCOV** - for each occupational group (see A4.10) at the workplace, managers were asked to estimate whether none, some, most or all of the employees in that group were union members. UNIONCOV took on a value of 0, 1, 2, or 3 respectively for the response for the largest occupational group at the workplace and modelled as a continuous variable.

**A4.12 LABCOST** - managers were asked to estimate the percentage of total costs at this workplace accounted for by labour costs (including wages and salaries, leave loadings, payroll tax, workers compensation premiums and superannuation contributions). The value of LABCOST was given the values for the corresponding responses, R:-

- 1 if R = "less than 20%";
- 2 if R = "21% - 40%";
- 3 if R = "41% - 60%";
- 4 if R = "61% - 80%";
- 5 if R = "More than 80%".

## REFERENCES

- Alexander, A. J. (1974), "Income, Experience, and the Structure of Internal Labour Markets", *Quarterly Journal of Economics*, Vol 88, pp. 63-83.
- Australian Bureau of Statistics, Catalogue No. 6353.0; (Training Expenditure Survey).
- ASTEC [Australian Science and Technology Council] (1987a), *Education and National Needs*, Report to the Prime Minister, AGPS.
- (1987b), *Wealth from Skills: Measures to Raise the Skills of the Workforce*, Report to the Prime Minister, AGPS.
- (1987c), *Wealth from Skills: Measures to Raise the Skills of the Workforce, Appendix A*, Report to the Prime Minister, AGPS.
- Becker, G. S. (1962), "Investment in Human Capital: A Theoretical Analysis", *Journal of Political Economy*, 70, Part 2, Supplement, pp. 9-49.
- Becker, G. S. (1975), *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*", 2nd edition, University of Chicago Press, Chicago.
- Callus, R., Morehead, A., Cully, M. & Buchanan, J., (1991) *Industrial Relations at Work: The Australia Workplace Industrial Relations Survey*, Commonwealth Department of Industrial Relations, AGPS, Canberra.
- Committee of Inquiry into Labour Market Programs (1985), *Report*, (The Kirby Report), AGPS, Canberra, January.
- Committee of Inquiry into Labour Market Training, (1974) *Report*, Government Printer of Australia, Canberra, May.
- Creedy, J., and Whitfield, K. (1988), "The Economic Analysis of Internal Labour Markets", *Bulletin of Economic Research*, 40 (4), pp. 247-269.
- Curtain, R. (1986), *Skill Formation and the Enterprise*, Paper prepared for the Joint Bureau of Labour Market Research/National Training Council's Workshop on Skill Formation.
- Curtain, R., Krbavac, L. and Stretton, A. (1986), *Skill Formation in Australia: In Search of a Research Agenda*, Paper prepared for the Joint Bureau of Labour Market Research/National Training Council's Workshop on Skill Formation.
- Dawkins, J. S. (1987), *Skills for Australia*, AGPS, Canberra.
- Department of Employment, Education and Training (1988), *Industry Training in Australia: The Need for Change*, AGPS Canberra.
- Dinkelspiel, J. R. (1981), "Education and Training Programs at Xerox", in *Workplace Perspectives on Education and Training*, P. B. Doeringer (ed.),

Martinus Nijhoff Publishing, Boston.

- Doeringer, P. B. and Piore, M. J. (1971), *Internal Labor Markets and Manpower Analysis*, Heath Lexington Books.
- Dunlop, J. T. (1957), "The Task of Contemporary Wage Theory", in *New Concepts in Wage Determination*, George W. Taylor and Frank C. Pierson (eds.), McGraw Hill, New York, pp. 117-139.
- Eckaus R. S. (1962), "Investment in Human Capital: A Comment", *Journal of Political Economy*, 70, Part 2, Supplement, pp. 501-504.
- Hashimoto, M. (1982), "Minimum Wage Effects on Training on the Job", *American Economic Review*, 72(5), pp 1070-1087.
- Kerr, C. (1954), "The Balkanization of Labour Markets" in Kerr, C. (1977), *The Balkanization of Labour Markets and Other Essays*, University of California Press, Berkeley, pp. 21-37.
- Krbavac, L. and Stretton, A. (1988), *Skill Formation and Structural Adjustment: The Responsiveness of Industry Training*, Department of Employment, Education and Training - Economic Division, Discussion Paper No. 3, AGPS Canberra, August.
- Miller, P. (1990) "Training in the Youth Labour Market, *Labour Economics and Productivity*, Vol. 2, No. 1, March, pp. 1-25.
- Miller, P. and Mulvey, C. (1989), "The Exit Voice Model of the Labour Market", Western Australian Labour Market Research Centre, Discussion Paper 89/3.
- Miller, P. W. and Volker, P. (1987), *The Youth Labour Market in Australia: A Survey of Issues and Evidence*, Discussion Paper No. 177, Centre for Economic Policy Research, ANU, Canberra.
- Mincer, J. (1962), "On-The-Job Training Costs, Returns and Some Implications", *Journal of Political Economy*, 70, Part 2, Supplement, pp. 50-79.
- Mincer, J. (1974), *Schooling, Experience and Earnings*, Columbia University Press, New York.
- Norris, K. (1984), "Job Durations in Australia", *Journal of Industrial Relations*, Vol. 26, No. 1, pp. 188-199.
- Norris, K. (1989), *The Economics of Australian Labour Markets*, 2nd ed., Longman Cheshire, Melbourne.
- Nowak, M. and Crockett, G.V.(1983), "The Operation of Internal Labour Markets: Three Case Studies", *Journal of Industrial Relations*, 25, 4, pp. 445-463.
- Oatey, M. (1970), "The Economics of Training with Respect to The Firm", *British Journal of Industrial Relations*, 8, (1), pp. 1-21
- Oi, W. Y. (1962), "Labor as a Quasi-Fixed Factor", *Journal of Political Economy*,

December, pp. 538-555.

- Pindyck, R. S., and Rubinfeld, D. L. (1981), *Econometric Models and Economic Forecasts*, McGraw-Hill, Singapore.
- Schultz, T. W. (1961), "Investment in Human Capital", *The American Economic Review*, Vol. LI, No. 1, March, pp. 1-17.
- Sloan, J. (1987), "Government Policy Options to Stimulate Investment in Training", *Wealth From Skills: Appendix*, Australian Science and Technology Council Submission to the Prime Minister, AGPS Canberra, 1987 pp. 65-73.
- Stromback, C. T. and Moy, P. J. (1989a), "Industry Training The Emerging Myth", *Labour Economics and Productivity*, Vol. 1, No. 2, September, pp. 11-122.
- Stromback, C. T. and Moy, P. J. (1989b), "Economic Analysis of Industrial Training Policy", *Submission to the Employment and Skills Formation Council*, Appendix A, Confederation of Western Australian Industry, March.
- Thomas, C. (1989), *Separation from Skilled Occupations: An analysis of 1986 Census Data for Selected Major Professions, Para-Professions and Trades*, Department of Employment, Education and Training Discussion Paper No. 6, September.
- Williamson, O. E., Wachter, M. W. and Harris, E. H. (1975), "Understanding the Employment Relation: The Analysis of Idiosyncratic Exchange", *The Bell Journal of Economics*, 6, pp. 250-277
- Ziderman, A. (1978), *Manpower Training: Theory and Policy*, Macmillan Studies in Economics, The Macmillan Press Ltd.

# The Australian Government's Affirmative Action Legislation: Achieving Social Change Through Human Resource Management

Valerie Braithwaite

## ABSTRACT

Data from the Affirmative Action Agency Public Reports and the Australian Workplace Industrial Relations Survey were used to review progress in the implementation of the Australian Government's Affirmative Action legislation and to examine the relationship between following mandatory procedures and achieving outcomes that impact positively on women's workforce experiences. The data suggest that while a relationship exists at the bivariate level, it becomes considerably weaker when organisational and workforce characteristics are controlled. The variables that emerged from the analyses as strong predictors of both procedural compliance and the adoption of accommodating practices for women centred around human resource management. Where companies were committed to human resource management, both procedural compliance and accommodating practices tended to be high. These data demonstrate the importance of linking legislation for social change with workplace functions, particularly when resistance to the legislation is high and capacity to enforce is low.

Occupational discrimination against women continues to be a serious problem in Australia (Australian Bureau of Statistics, 1993; Affirmative Action Agency, 1992; Burton, 1991; Poiner & Wills, 1991). The workforce is highly segregated with three quarters of women's employment taking place in occupations that are at least 70% female (Rimmer, 1991). Furthermore, women are under-represented at the management levels of most occupations, particularly among senior management. Only 6% of senior managers in Australia are women and only three per cent of companies are headed by women (Australian Financial Review 1 November 1991). Women's earnings remain below those of men, a gender bias which remains even after occupation is taken into account (Rimmer, 1991).

The problem is being addressed in a variety of ways with full recognition that changes at one level need to be accompanied by changes at other levels (Baxter & Gibson, 1990; Burton, 1991; Poiner & Wills, 1991). Thus, programs and campaigns operate to ensure gender equity in education and training, to provide

child care support, to promote the sharing of unpaid work and the contribution of women in non-traditional fields, and to challenge the negative stereotypes of women presented by major institutions, in particular the media, the judiciary and the church. These pressures for change and reform have been backed by legislation of two kinds - those acts of state and federal parliament which empower individuals to seek redress for discrimination in the workplace and those which are geared to preventing the occurrence of sexual discrimination through setting standards for how workplaces should function. The Australian Government's Affirmative Action (Equal Employment Opportunity for Women) Act 1986 falls into the second category (Ronalds, 1987). Its implementation and its effects on workplace practices are the concern of this paper.

The Affirmative Action Act applies to private sector organisations with more than 100 employees and to higher education institutions. The goals of the legislation are twofold - to remove sex discrimination from the workplace and promote equal employment opportunity for women. To achieve these goals, the legislation seeks to remove the structural barriers in the workplace that have resulted in women being concentrated in relatively poorly paid and low status positions, with limited career paths, reduced likelihood of promotion, and limited benefits (Baxter & Gibson, 1990; Game & Pringle, 1983; O'Donnell, 1984; O'Donnell & Hall, 1988; Walby, 1988). The legislation does not insist on employers achieving a particular set of outcomes. Employers are not required by law to achieve certain quotas for the employment of women or for their advancement through the ranks, nor are they required to set up child care centres, specific training courses for women, or keep records of complaints of discrimination. Instead, the Affirmative Action Act prompts employers to ask questions and find solutions which meet the needs of their particular organisation. To use Donabedian's (1966) distinction between inputs, processes and outcomes, the Affirmative Action Act focuses on inputs and processes. The presumption is that if the structures and procedures are in place to enable regular review and critical self-appraisal, discriminatory practices will be identified and changed, and one crucial nail will be put in the coffin of a workforce segregated by gender.

The legislation requires the setting up of affirmative action programs by employers which incorporate the following eight steps: (1) issuing an Equal Employment Opportunity policy statement to all employees, (2) assigning responsibility to a senior officer, (3) consulting with trade unions, (4) consulting with employees, particularly women, (5) the collection of statistics to observe the gender by job classification breakdown, (6) a review of personnel policies and practices, (7) the setting of forward estimates and objectives, and (8) the monitoring and evaluation of the program. The progress of companies in implementing the eight steps required by the legislation is monitored through a self-reporting process. The vast majority of companies annually complete and submit a form provided by the Affirmative Action Agency.<sup>1</sup>

Sanctions for not complying with the legislation are weak (Thornton, 1990). If a report is not lodged with the Agency without good reason, the employer is named in parliament. In 1992, the sanctions were strengthened with the introduction of

<sup>1</sup> Business units don't have to use the standard report form and can devise their own. They can also submit confidential reports. These practices are rarely adopted. In 1989-90, 10% elected to use a non-standard report form and 7% submitted confidential reports (Affirmative Action Agency, Annual Report, 1989-90). By 1990-91, the percentages had dropped to 5% and 1% respectively (Affirmative Action Agency, Annual Report, 1990-91).

contract compliance (Affirmative Action (Equal Employment Opportunity for Women) Amendment Act 1992). Those employers who failed to comply with the requirements of the Act would not be eligible for consideration for government contracts or specified industry assistance. In the absence of standards to define quality affirmative action programs, however, the legislation does not lend itself to the use of penalties to gain full compliance. The primary incentives for companies to introduce effective EEO practices are to be good citizens, to be *seen* as good citizens and to adopt good business practice.

Recognition of these incentives is at the core of the Affirmative Action Agency's regulatory strategy. Its regulatory posture has been one of conciliation, education and persuasion. Through a quarterly newsletter ("Action News"), special publications and seminars (Annual Reports, 88-89, 89-90; Taking Steps, 1990), recognition of employer initiatives (the annual Affirmative Action Awards), and through fulfilling their ongoing advisory function, the Agency has sought to convince its clientele that the legislation does not threaten the independent and smooth operation of organisations, but rather identifies a means by which human resources can be better managed to achieve greater efficiency for the organisation. In the words of the Director of the Affirmative Action Agency:

These [eight affirmative action] steps are a blueprint for good management of human resources and many employers regard their affirmative action program as a productivity exercise. Many recognise the importance of integrating affirmative action principles and objectives in other processes of reform occurring at the workplace or enterprise level. (From Affirmative Action Agency, Taking Steps, 1990, p. vii)

## **AFFIRMATIVE ACTION, EQUAL EMPLOYMENT OPPORTUNITY AND HUMAN RESOURCE MANAGEMENT**

While the terms, affirmative action, equal employment opportunity and human resource management, have been used interchangeably at the level of policy implementation, they are to be distinguished at the theoretical level. A basic distinction has been made between the procedural and substantive interpretations of EEO/AA law (Edelman, Petterson, Chambliss & Erlanger, 1991). The procedural interpretation holds that men and women must be treated equally in employment decision making. This interpretation is compatible with the term equal employment opportunity, but not with the term affirmative action. The substantive interpretation defines equality not in terms of process but outcome. Thus, the substantive interpretation includes "an affirmative effort to promote the interests of previously unrepresented groups" (p.76). The substantive interpretation makes way for affirmative action programs that give preferential treatment to women as a means of correcting the past effects of discrimination.

Whereas affirmative action and equal employment opportunity are policies designed to protect the rights of employees, human resource management (HRM) is a strategy to help managers make the best use of their workforce (Storey, 1989). According to Guest (1987), the key components of HRM are maximising organisational integration and building employee commitment, flexibility and quality of work (Guest, 1987). Thus, policies which increase the commitment of women, the quality of their work and their flexibility in the workplace do have a place under the human resource management umbrella. A problem can arise,

however, when women's commitment, quality of work, and flexibility is not essential to the strategic plan of the organisation. EEO/AA policies are less likely to be endorsed where outcomes in the form of a better quality product or service are unclear or where initiatives adversely affect the productivity of others in the workforce. In a recent study of EEO officers (Braithwaite, 1992), programs for only female employees were frequently rejected because of the likely harm done to the morale of male employees.

This description of human resource management is the "hard" version that maximally distinguishes HRM from personnel management (Legge, 1989; Storey, 1989). Personnel management can be likened to the "soft" version of HRM since it is less concerned about integrating human resources into the strategic plan of the organisation. According to Torrington & Hall (1987), personnel management is more person-oriented, based on the premise that people must be treated as dignified human beings who will be effective as employees if their job-related personal needs are met. In spite of these differences in emphasis, both Guest (1987) and Legge (1989) claim that, in practice, the two approaches to managing people are likely to overlap considerably.

Given the different foci of affirmative action (equal outcomes), equal employment opportunity (equal treatment), human resource management (maximise individual effectiveness) and personnel management (satisfy individual needs), it is not surprising that there have been critics of the legislation and the Affirmative Action Agency's approach to its implementation (e.g. see Burton, 1991; Poiner & Wills, 1991; Sawyer, 1990; Thornton, 1990). Criticisms have tended to centre around three issues. First, concern has been expressed over the gap between procedural process as outlined in the eight steps of the legislation and outcomes. Thornton (1990) acknowledges that the legislation "contain[s] some vague idea that the workforce profile with respect to women is to be improved, but is critical of there being "no specific suggestions as to *how* this might be achieved..." (p.230). In the 1992 Effectiveness Review of the Affirmative Action Act (Affirmative Action Agency, 1992), it was noted that "A common criticism of EEO programs has been that they are highly proceduralized without clear connections to positive outcomes" (p. 73). The Agency has responded in terms of the development of performance indicators that provide quantitative summaries on the degree of occupational segregation, job security, and remuneration (see Affirmative Action Agency, 1992). Yet this is a rather narrow conception of outcome in that it does not take into account qualitative aspects of the work experience. Poiner and Wills (1991) take up this issue in concluding that the legislation has nothing exciting to say to female employees because it is about the administrative procedures of management and not about child care, permanent part-time work, flexible working hours and the like. It is left to management, in consultation with employees according to the legislation, to decide on the particular programs that improve the working life of women.

The second set of criticisms express concern about the limits to social change that can be achieved under the human resource management umbrella. To quote Burton (1991): "this focus—on the human resources needs of enterprises—allows much that needs to be changed to be left intact, in particular, the 'masculine' values which predominate in work organisations in the public and private sectors, and to which women are expected to conform." (p. xiii). For many who subscribe to the philosophy of human resource management, accommodating workforce diversity is no more than a means to an end. Creating a corporate culture and moulding

individuals into the culture is a higher priority than providing for the different needs of individuals:

The needs of our business will be most effectively attained if the needs of people for fulfilment, success, and meaning, are met....

But they are not more than that. ...the needs of the business must come first. (Barham et al. 1988, p. 28 cited in Legge, 1989)

Poiner and Wills (1991) evocatively present the potential conflict by contrasting an HRM program where "disadvantaged groups are sent off to assertiveness training sessions" with an EEO/AA program where "employers create work environments in which less 'assertive' employees can be productive and prosper" (p.16). Poiner and Wills go on to conclude that EEO/AA legislation will only benefit women who have their foot in the door, who fit the corporate image, and will do nothing to provide opportunities for those women whose style or needs are different. Thornton (1990) makes a similar point through her criticism of the "consummate role of merit" (p.230) in the legislation:

Nothing in this Act shall be taken to require a relevant employer to take any action incompatible with the principle that employment matters should be dealt with on the basis of merit. (Affirmative Action Act 1986, Section 3 (4))

Both Burton (1991) and Thornton (1990) recognise the difficulty and subjectivity in defining merit. Invariably, indicators of merit are tied closely to "organisational and institutional interests" (Cohen & Pfeffer, 1986, p.2). Through insisting that employers refrain from action that is incompatible with the principle of merit, Thornton argues, the message given is "that no change in the traditional nature of allocations is intended" (p.230).

The third body of criticism is levelled against the self-regulatory nature of the legislation. Claims have been made that the annual reports present a distorted picture of what is actually taking place in the organisation (Affirmative Action Agency, 1992; Poiner & Wills, 1991). The Agency rejects this criticism on the grounds that their own anonymous survey revealed that 75% of companies maintained that their reports were accurate, 12 % claimed they had under reported and 13% that they had exaggerated. In contrast, the Victorian Trades Hall Council (1992) audited 20 companies and found that while 67% claimed to have consulted with unions in their public reports, actual consultation could be verified in only 22% of cases. These seemingly conflicting findings can be reconciled. The problem may not be so much one of deliberate falsification as ignorance about what is actually happening with regard to EEO/AA in their company. Only a very small proportion of companies have someone who spends most of their time on EEO/AA activities (9%) (Affirmative Action Agency, 1992).

## RESEARCH GOALS

The gaps between procedures and outcomes, between human resource management and outcomes, and between self-reports to the Agency and organisational practice are each addressed by drawing on quantitative data from two different sources: (1) the public reports from the private sector<sup>2</sup> lodged with the Affirmative Action

<sup>2</sup> Higher education institutions have not been included.

Agency for the period 1989-90 and 1990-91 and (2) the 1989-90 Australian Workplace Industrial Relations Survey (AWIRS) (Callus, Morehead, Cully & Buchanan, 1991).

The public reports provide an excellent sample of companies covered by the legislation. In both 1990 and 1991, the percentage complying with the legislation by lodging a report was 96%.<sup>3</sup> The unit of analysis for the public reports is the business unit. A business unit may consist of a conglomerate of companies, a single company or a workplace within a company. Employers are responsible for defining their business unit or units.

The unit of analysis for the AWIRS data set is different from that of the public reports. The Australian Workplace Industrial Relations Survey represents a stratified random sample of workplaces, excluding those classified by the Australian Bureau of Statistics under defence and agriculture. The AWIRS data set captures organizations in both the public and private sector. Since the public sector is covered by legislation which is comparable to the Affirmative Action Act, these organizations were not removed from the sample. Excluded from the AWIRS data set were those workplaces with fewer than 100 employees because they were likely to fall outside the population covered by the Act.<sup>4</sup>

These two independent sources of information on the implementation of the EEO/AA legislation are used to address three specific research questions. The first examines the degree to which administrative procedures required by legislation are dissociated from work practices that are not mandatory, but directly affect women's experiences in the workplace. This question is addressed using both the public reports and the AWIRS. If deliberate falsification to impress the Affirmative Action Agency is taking place, the public report data should provide a more positive picture of the progress that is being made and of the link between procedural compliance and the achievement of outcomes. Convergence in findings from the public reports and the AWIRS, on the other hand, would suggest that a response bias to impress regulators was not the most likely explanation for findings based on the public reports.<sup>5</sup>

The second question focuses on the AWIRS data set to ascertain the strength of the relationship between procedural compliance and human resource management, and between the adoption of accommodating work practices for women and human resource management.

The third question extends this analysis by taking organizational characteristics into account as well as strategies for human resource management. The final set of analyses identify the major predictors of procedural compliance and accommodating practices and the extent to which their relationship can be explained in terms of other variables.

---

3 The base for this percentage is the number of business units registered with the Agency. It is not known how many business units have failed to register, although the number is expected to be small.

4 The resulting sample represents a conservative estimate of companies covered by legislation because of the exclusion of workplaces with fewer than 100 employees that were part of a larger business unit reporting to the Affirmative Action Agency.

5 It must be emphasized that in answering this question, the equally important issue of the gap between workplace practice from the perspective of employees and from the perspective of management is left untouched.

Of particular interest in the final set of analyses are differences between the models predicting procedural compliance and accommodating practices. Administrative procedures are regarded as having greater applicability across organizational contexts than specific EEO/AA initiatives. Based on this premise, the Affirmative Action Agency has set up special advisory services for different industry groups and published implementation guidelines for organizations of different sizes (see Affirmative Action Agency Annual Reports from 1988 through 1991). The need to tailor initiatives to the organizational context is understandable. A training program for women in a male dominated industry such as steel would not have the same impact as a training program in a traditionally female dominated industry such as hairdressing. It remains to be seen, however, whether procedural compliance varies across contexts and whether the total number of initiatives is as constrained by the organizational context as specific initiatives appear to be. The final analyses provide an opportunity to examine the relative importance of the organizational context in predicting procedural compliance and the number of accommodating practices adopted in the workplace.

## KEY VARIABLES

In order to address these questions, a set of numerical indices were developed. The central variables were defined as follows:

**Procedural compliance:** This was a numerical index defined in terms of the number of steps in the legislation that companies reported implementing. Slightly different, but comparable measures were developed from the public report data and the AWIRS data.

**Accommodating Practices:** The number of programs that have theoretical importance in facilitating women's work force participation were summed to give a measure of accommodating practices. Such programs include those that assist with juggling family responsibilities and provide opportunities for training. Two rather different indices were developed, one from the public reports, the other from the AWIRS.

**Human resource management commitment:** Measures of commitment to human resource management could only be developed within the AWIRS data set. Three facets of human resource management were measured through three separate indices. The first represented the degree to which the organization had invested resources in communication, an essential component in building commitment and a coherent, strong culture (Legge, 1989). The second captured the "hard" side of HRM, strategies adopted by management to use human resources in the most effective way possible (Guest, 1987; Keep, 1989; Torrington, 1989; Storey, 1989). The third represented the "soft" side of HRM or the personnel management approach, providing resources that satisfy the needs of employees (Torrington, 1989). This latter measure excluded provisions that were of particular benefit to women since they had already been included in the accommodating practices index.

## PUBLIC REPORTS

### Procedural Compliance

In the 1989-90 and 1990-91 annual affirmative action reports, business units answered a series of questions indicating which of the eight steps they have undertaken and how the steps have been implemented. Ten questions taken directly from the report to represent procedural compliance are given in Table 1, along with rates of implementation over the two reporting periods.<sup>6</sup>

A notable feature of the data presented in Table 1 is the low implementation rates associated with consultation, setting forward estimates and evaluation. Companies clearly are not reluctant to acknowledge their non-compliance with the legislation. One possible interpretation is that lower rates of implementation are due to smaller and medium sized companies being late starters and having yet to get around to attending to the more time consuming steps. The reporting requirement came into effect over a three year period, with band 1 employers (employers with 1000 employees or more) first reporting in 1987, band 2 employers (those with between 500 and 999 employees) in 1988 and band 3 employers (those with 100 to 499 employees) in 1989. The pattern did not change, however, when the staggered entry of companies was taken into account. When compliance was examined by time of entry, levels of implementation were generally lower in smaller companies, but the poorly implemented steps remained the same.

The responses to the ten questions in Table 1 were coded such that business units were given a score of 2 for compliance, 1 for non-compliance and 1.5 for partial compliance. If companies indicated that union consultation was not applicable to them, they were given a score of 1.<sup>7</sup> Responses to the ten questions were positively intercorrelated, suggesting that it was legitimate to conceptualize compliance in terms of a single underlying continuum. The alpha reliability coefficient for the items was .83 in 1989-90 and .78 in 1990-91, thereby justifying the summing of responses to form a procedural compliance scale. In neither reporting period was the alpha coefficient improved by the deletion of any item. Scale scores ranged from 10 to 20 with a mean of 16.25 in 1989-90 and 16.74 in 1990-91.

---

<sup>6</sup> Not included is Step 5, examining the employment profile by gender. The public report data set did not include a readily accessible quantitative index of whether the business unit had analyzed their profile in any systematic way. When the Affirmative Action Agency (1992) described performance on this step, they reported little variation with 99% of business units in compliance.

<sup>7</sup> These companies were thereby penalized for not having union representation in their workplace. The effect on the results, however, was negligible. The pattern of results did not change markedly when analyses were rerun giving such companies an advantage by scoring them 2.

**Table 1: Implementation rates in 1989-90 (N=2363) and 1990-91(N=2340)**

Step	Question ¶	% yes (1989-90)	% yes (1990-91)
1	Has the business unit issued an affirmative action policy statement to all employees?	79.6	86.6
2	Has the business unit assigned responsibility for the affirmative action program to a senior person(s)?	92.9	94.8
3	Has the business unit consulted with unions whose members are affected by the affirmative action program?	21.6 † 21.8 ‡	20.0 † 22.9 ‡
4	Has the business unit consulted with women employees over the affirmative action program?	24.6 † 44.2 ‡	21.1 † 54.0 ‡
4	Has the business unit consulted with employees in general over the affirmative action program?	27.0 † 44.9 ‡	20.2 † 51.5 ‡
6	Has the business unit started a review and analysis of personnel policies and practices during the year ending 31 January 1990?	70.5	82.3
7	Has the business unit set objectives for its affirmative action program during the year ending 31 January 1990?	63.1	70.6
7	Has the business unit set or updated forward estimates for its affirmative action program during the year ending 31 January 1990?	35.8	37.1
8	Have monitoring procedures been set in place?	60.1	73.6
8	Have evaluation procedures been set in place?	55.8	68.4

† all

‡ some

¶ Questions 3 to 10 were worded somewhat differently in 1990-91. The major difference is the addition of 'during the reporting period' in the 1990-91 form.

### Accommodating actions

As part of the process of assessing the annual reports, the Affirmative Action Agency has developed a system of keywords that indicate whether or not specific initiatives have been undertaken in particular business units. Of these keywords, thirteen were regarded as indicative of business units going beyond procedural compliance and seeing the relevance of EEO/AA law to workplace practices. The percent of companies assigned these keywords are reported in Table 2. The keywords differed somewhat from 1990 to 1991, so that direct comparisons of frequencies are not always possible.

**Table 2: Percent of business units demonstrating involvement in activities to accommodate women's needs in the workplace (Affirmative Action Public Reports)**

Keywords indicating involvement	1989-90	1990-91
Award restructuring	7.1	9.8
Career break schemes	.3	.5
Promoting non-traditional work for women	2.3	3.8
Addressing structural barriers to women's employment	.7	.7
Training in career planning	1.8	1.7
Re-training	.6	na
Re-entry training	0.0	na
Management development programs for women	.5	na
Women's networks	.2	na
Workers with family responsibilities	4.3	4.7
Affirmative action awareness training	2.7	2.9
Ensuring women have access to training	na	4.5
Recognizing women's employment needs when complying with the Training Guarantee Act	na	1.4

na not applicable

The changes that are reported as initiatives to accommodate women are small, although the Affirmative Action Agency has pointed out that companies often don't recognize EEO/AA initiatives as such and do not report them. Based on their survey of EEO coordinators (52% responded), the Agency found that 85% had introduced one or more of flexible working hours, child care assistance, or using award restructuring to improve women's access to training (Affirmative Action Agency, 1992). From Table 2, the most frequently mentioned initiatives from the public report data involved award restructuring and workers with family responsibility. It is of interest that both have received considerable backing from sources other than the EEO/AA legislation. These issues have been given a high profile in the community through the industrial relations system, through other government agencies, and through Australia's ratification of International Labour Organization Convention 156.

Of the eleven initiatives examined in 1989-90, 83.5% of business units did not make reference to any in their report, 12.9% acknowledged implementing one, 3.1% two and .4% three. By 1990-91, the pattern of responses had improved but remained unimpressive. No initiatives were mentioned by 75.9% of business units, one initiative was recorded for 19.1%, two for 4.5%, and 3 for .5%. A count of the number of initiatives reported to the Agency was regarded as the most suitable indicator of a business unit's commitment to accommodating women in the workplace. The assumption is that companies that place a higher priority on EEO/AA practices will have implemented more initiatives and will think to mention them in their report to the Agency.

### **Are procedural compliance and accommodating practices related?**

For the 1989-90 reporting period, the correlation between procedural compliance and accommodating practices was positive and significant ( $r = .22, p < .01$ ). The relationship between these variables in 1990-91 was very similar ( $r = .24, p < .01$ ).

While these results are encouraging for legislators, interpretation is hampered by problems of causality, confounding variables, and of more immediate importance, the reliability and validity of the measures. The compliance scale was the stronger of the two. Over a 12 month period, a general improvement in performance is to be expected, but the relative positioning of the companies should not change dramatically. This prediction is supported by a relatively strong correlation between the procedural compliance scores for the 1989-90 and 1990-91 reporting periods ( $r = .58, p < .001$ ). As anticipated given the staggered commencement dates for companies of different sizes, compliance for the 1989-90 period was related to the size of the organization ( $r = .24, p < .01$ ) and the time that had elapsed since the first policy statement was issued ( $r = .58, p < .001$ ).

The much lower stability over time associated with the accommodating practices index is of concern ( $r = .24, p < .01$ ). The relatively low correlation between the accommodating practices indices for 1989-90 and 1990-91 may reflect unreliability or differences in keywords across reporting periods. More encouraging were the findings that the accommodating practices index, like the compliance scale, correlated positively with the size of the organization and the time that had elapsed since the first policy statement was issued ( $r = .28, p < .01$  and  $r = .25, p < .01$  respectively). Because of concerns about the reliability of the accommodating

practices index, it was useful to compare these results with those obtained using the AWIRS data set.

## THE AUSTRALIAN WORKPLACE INDUSTRIAL RELATIONS SURVEY

The procedural compliance measure derived from the AWIRS was not as comprehensive as that developed from the public reports with proxy measures available for only five of the eight steps: having a policy statement, appointing a senior officer responsible for EEO, consulting with unions, reviewing personnel practices and setting employment objectives. The six relevant questions from the Employee Relations Management Questionnaire reflect an organization's willingness to implement the legislation to remove sex discrimination and to set up processes to further this objective (see Table 3). The percentage of managers endorsing each item are presented in Table 3. The responses to these items were intercorrelated (alpha reliability coefficient = .62), once again justifying the development of a procedural compliance scale. Scores were normally distributed and ranged from 6 to 12 (mean = 9.10, standard deviation = 1.46), with higher scores indicating higher compliance.

The AWIRS accommodating practices index comprised seven items that appear in Table 3 along with the percent of workplaces engaged in each activity. For six items, the informant was the employee relations manager. The seventh item was constructed from the Employee Profile Questionnaire in which the number of permanent part-time positions was recorded. This variable was scored dichotomously (present=2 or absent=1) as were the other items in the accommodating practices index. Total scores ranged from 7 to 14. The scores were normally distributed with a mean of 10.70 (standard deviation = 1.30).

The AWIRS accommodating practices index revealed greater activity in the business community than was suggested by the public reports. These data support the Agency's claim that those who complete the annual report on EEO/AA are not aware of activities in the company that could be classified as EEO/AA initiatives. In contrast to the public reports, the AWIRS items at the time of data collection were in no way linked with programs addressing discrimination against women. Nevertheless, such workplace practices are potentially of greater benefit to women than men.

The AWIRS accommodating practices index is stronger than its counterpart developed from the public reports. The measure is based on closed response questions whereas the public report version was developed from the Affirmative Action Agency's coding of qualitative information. In the latter case, EEO officers could forget to record an initiative in their annual report or the Affirmative Action Agency could fail to recognize and/or code an initiative while reviewing the report.

When the procedural compliance scale and the accommodating actions index were correlated for the AWIRS, the Pearson product moment correlation coefficient was .31 ( $p < .01$ ). Different data and different measures confirmed the findings from the public report data: that setting up the processes that are mandatory under the Affirmative Action legislation is associated with workplace initiatives which potentially benefit women.

**Table 3: The compliance (N=810) and accommodating practices (N=808) measures taken from the AWIRS data set**

Procedural compliance and accommodating practices	% yes
Procedural compliance	
Does this workplace have ...	
a written policy on EEO ? (Step 1)	81
a person in the organization responsible for promoting EEO ? (Step 2) ¶	73
a person in the organization spending the majority of her/his time on EEO ? (Step 2) †	38
an agreement in writing with a union on EEO ? (Step 3)	28
employment targets for women in male dominated positions ? (Step 7)	12
jobs which are only available for men ? (Step 6) ‡	19
Accommodating practices	
Child care facilities	3
Rostered days off	80
Leave to care for sick family members	58
Paternity leave	11
Paid leave or financial assistance for study for non-managerial staff	77
Formal instruction program to develop skills	76
Permanent part-time positions	64

¶ This person may be at this workplace or higher up. The variable is constructed from two variables, EF2 and EF5 (See AWIRS Employee Relations Management Questionnaire, User's Guide, SSDA Study No. 600).

† This person may be at this workplace or higher up. The variable is constructed from two variables, EF3 and EF6 (See AWIRS Employee Relations Management Questionnaire, User's Guide, SSDA Study No. 600).

‡ This item was reverse scored for the procedural compliance scale.

## AWIRS AND HUMAN RESOURCE MANAGEMENT

### Measuring Three Aspects Of Human Resource Management

Given the range of definitions and meanings attached to human resource management, the approach to its measurement in this context requires some elaboration. Having employees with human resource management in their work titles was not regarded as a sufficiently sensitive measure of commitment to human resource management principles. As Guest (1987) and Legge (1989) have pointed out, there are many examples of changes in titles to reflect the new fashion without substantive changes in style of operation or conceptualization. At the heart of human resource management models are notions that human resources are integrated into strategic planning and business strategy, that employees have commitment to the organization, that employees are adaptable and flexible, and that quality is achieved in staffing, in performance and in the public image (Guest, 1987). Organizations with interest in human resource management models, therefore, might be expected to expend resources on developing and nurturing the skills of its workforce, on ensuring effective methods of communication to build commitment and clarity of purpose, and on adopting workplace practices that use the workforce in the most effective way possible. To capture management's endorsement of this philosophy, the following three scales were developed from the Employee Relations Questionnaire.

#### The Communications Scale

Effort devoted to communications was measured through a scale tapping the availability of seven forms of communication between management and employees: (a) workplace newsletter or staff bulletin, (b) regular meetings between senior management and employees, (c) task forces, ad hoc committees or working parties, (d) regular meetings between employees and supervisors or line management, (e) ongoing formal joint consultative committees, (f) quality circles or productivity improvement groups, and (g) regular social functions. Each method of communication was scored as present (2) or absent (1). Their alpha reliability coefficient was .62 and could not be improved through omitting any of the items.

#### Employee Relations Scale

The second scale representing the "soft" side of human resource management measured the provision of benefits and facilities for employees which would enable them to give their best performance to the organization. The nine items used for this scale involved the provision of : (a) a canteen, (b) English classes, (c) facilities for people with disabilities, (d) medical and dental care, (e) welfare or counselling, (f) recreation and fitness facilities, (g) social club, (h) security of employment, and (i) employee relations training for first line supervisors. Again the items were scored as present (2) or absent (1). The alpha reliability for the scale was .64 with all items contributing to the cohesiveness of the scale.

## Management Strategies Scale

The third scale comprised seven items representing the "hard" side of human resource management, that is, the use of management strategies to obtain the most effective results from employees: (a) a training scheme, (b) job redesign, (c) semi-autonomous work groups, (d) skills audit, (e) staff appraisal, (f) quality circles, and (g) total quality control. Using a 1-2 scoring system for each item, the alpha reliability for this scale was .63 with all items making a positive contribution to the scale's internal consistency.

When the three scales were intercorrelated with each other, the overlap referred to by Guest (1987) and Legge (1989) was evident. The "soft" and "hard" applications of HRM tended to proceed hand in hand. The employee relations scale correlated .35 with management strategies, while the communications scale correlated .42 with management strategies and .45 with employee relations.

## PROCEDURAL COMPLIANCE, ACCOMMODATING PRACTICES AND HUMAN RESOURCE MANAGEMENT

As predicted, both procedural compliance and accommodating practices were correlated significantly with the human resource management scales (see Tables 4 and 5 for the Pearson product moment correlation coefficients). The strongest correlate was employee relations, followed by communications, and lastly, management strategies. The human resource management scales tended to be more strongly linked to the accommodating practices index than to procedural compliance. This is consistent with the Affirmative Action Agency's intention that the private sector regard EEO/AA legislation as good business practice rather than as an administrative procedure that does not impinge on the day to day running of the organization.

## PREDICTING PROCEDURAL COMPLIANCE USING AWIRS

The above findings confirm the hypothesis that workplaces that strongly endorse human resource management are also workplaces that are more strongly committed to the legislation. Yet other variables may be important predictors of compliance in their own right and may explain the relationship between procedural compliance and accommodating practices. These variables fall into two broad categories: organizational structure and workforce characteristics, demands and pressures.

### Organizational Structure

Five aspects of the organization's structure were considered important. First, the size of the organization was relevant, the hypothesis being that larger organizations would have more resources for implementing the legislation and would have had more time to implement it effectively. Arguments of resources and time can be extended to differentiate the public and private sector. Because of an earlier commencement date, public sector organizations were expected to be more advanced than those in the private sector. In addition, public sector workplaces

could be expected to have relatively less opportunity for ignoring the legislative requirements.

Compliance with the legislation was also likely to be affected by the degree to which the workplace had autonomy to make decisions about EEO implementation. A case can be made for an effect either way. In 1987 with changes to the administration of EEO/AA in the Australian Public Service, Burton (1991) argued that having a central agency with the responsibility for monitoring programs across departments and workplaces was a far more effective means of achieving change than devolving responsibility to departments or work groups. On the other hand, a workplace which sees the value of EEO might be hampered in implementation by an overly controlling and unsympathetic head office. Four measures of autonomy were adopted. The first was the relatively crude index of whether or not there were other workplaces in the organization. The second was whether or not the workplace was controlled or owned by another. The third was whether or not the workplace had an overseas head office. This was a particularly interesting variable in that a more progressive overseas head office could expect more vigorous implementation of equal employment opportunity than was customary in Australian workplaces. The fourth was a four item scale comprising items that asked general management who made decisions about (a) a new senior manager at the workplace, (b) a decrease in the number of full-time employees by 10%, (c) the introduction of a new bonus or incentive scheme, and (d) the use of financial or budgetary surplus. Responses were rescored into three categories: (1) others decide, (2) this workplace makes a recommendation, and (3) no-one else decides. In cases of a single workplace, the maximum score of 12 was assigned. The scale had an alpha reliability coefficient of .84 which could not be improved by the deletion of any item.

Finally, industry type was added to the list of control variables. The procedures are assumed to be applicable across contexts, but it is not known whether some industries have implemented the legislation more successfully than others. Workplaces were coded into eleven categories using the Australian Standard Industry Classification.

### **Workforce Characteristics, Demands And Pressures**

Other variables considered to be important in determining business reaction to the legislation were more individualistic and social. Reforms may be dependant on a critical mass of women in the workplace, making the proportion of women a relevant consideration. Also potentially important were the proportion of older employees and the proportion of migrants. Older employees may be less willing to accept EEO principles, while a large migrant population may increase management's awareness of the need to be responsive to diversity in the workforce. In terms of the demands of the job, a system of internal promotions and high on the job training costs may encourage the introduction of a serious EEO program to keep highly valued staff. Finally, outside influences may serve to prioritize EEO as an issue in the workplace, not only in a procedural sense, but also in terms of working conditions for women. Union influence is the most obvious pressure of this kind, but outside consultants and employer associations may also play a part in bringing about change which is both procedural and related to women's working conditions.

## A Regression Model Predicting Procedural Compliance

**Table 4:** Changes in  $R^2$  and beta coefficients for hierarchical least squares regression models predicting procedural compliance ( $N = 772$ )

Predictors	$r$	beta coefficients	
		Model 1 controls	Model 2 controls + HRM
<i>Controls</i>			
Organizational size <sup>a</sup>	.08**	.05	-.04
Public sector <sup>b</sup>	.27**	.28**	.21**
Multiple workplaces <sup>b</sup>	.15**	-.02	-.02
Overseas head office <sup>b</sup>	-.06*	.04	.00
Controlled workplace <sup>b</sup>	.25**	.19**	.16**
Decision-making autonomy	-.26**	-.07	-.07
Mining <sup>c</sup>	-.06*	-.02	.01
Electricity <sup>c</sup>	.02	-.02	-.01
Construction <sup>c</sup>	-.05	-.06	-.03
Wholesale, retail <sup>c</sup>	.12**	.19**	.23**
Transport <sup>c</sup>	-.01	-.06	-.03
Communications <sup>c</sup>	.19**	.10**	.10**
Finance <sup>c</sup>	.02	.08*	.10**
Public administration <sup>c</sup>	.05	.02	.04
Community, <sup>c</sup>	.09**	.05	.06
Recreation <sup>c</sup>	-.09**	.01	.02
Percent over 50 years of age <sup>d</sup>	-.02	.02	.02
Percent migrants <sup>d</sup>	.00	.09**	.07*
Percent female	.07*	.06	.05
Time to learn job <sup>e</sup>	.18**	.10**	.06
Percent managers promoted from within <sup>e</sup>	.30**	.20**	.18**
No. of unions <sup>f</sup>	.14**	.06	.03
Advice from employee associations <sup>b</sup>	-.06*	-.02	.01
Advice from consultants <sup>b</sup>	.10**	.11**	.09**
<i>Human resource management (HRM)</i>			
Communications scale	.22**		.06
Employee relations scale	.34**		.23**
Management strategies scale	.17**		.06
Adjusted $R^2$		.27**	.32**
Change in $R^2$			.05**

\* significant at the .05 level

\*\* significant at the .01 level

a Organizational size was collapsed into 6 categories: 100-150 = 1; 151-200 = 2; 201-300 = 3; 301-600 = 4; 601-1000 = 5; 10001 = 6.

b Dichotomous variable scored 2, other 1.

c The 11 ASIC categories were converted into 10 dummy variables, scored 0 and 1, with the largest category, manufacturing, being the omitted variable.

d This variable is collapsed into four categories assumed to behave as an interval scale.

e This variable is collapsed into six categories assumed to behave as an interval scale.

f The range of this variable is truncated at 16. Thus, if the number of unions exceeded 16, the variable is scored 16.

The way in which organizational and workforce characteristics and human resource management strategies combine to affect procedural compliance was investigated using hierarchical least squares regression analysis. This analysis provided the opportunity to establish whether human resource management was important in predicting procedural compliance when other factors were controlled. The organizational and workforce characteristics were entered into the model in one block as the control variables (see Table 4). They accounted for a substantial 27 % of variance in procedural compliance. Subsequently, the human resource management variables were entered into the equation. They accounted for an additional and significant 5% of variance. This analysis shows that the human resource management variables are important in their own right as predictors of procedural compliance.

From the beta coefficients in Table 4, nine variables made a significant contribution, eight of them being control variables. The public sector was significantly more likely to be in compliance with the legislation than the private sector, as were workplaces which were controlled or owned by another workplace. Compliance was also likely to be greater in workforces that had a high proportion of managers promoted from within and that had a high proportion of migrant workers. Calling on outside consultants on EEO was also an indication of higher procedural compliance. Industry type also accounted for differences in compliance with the wholesale-retail industries, communications industries and finance industries performing well.

The most important human resource management variable was the employee relations scale representing the "soft" side of HRM. At the same time, it is important to note that all three human resource management scales were correlated with procedural compliance and made a significant contribution to the regression model when they were entered individually. Their relatively strong interrelationships, however, resulted in the employee relations scale dominating to the detriment of the other two in the composite model presented in Table 4.

## PREDICTING ACCOMMODATING PRACTICES USING AWIRS

**TABLE 5: CHANGES IN R<sup>2</sup> AND BETA COEFFICIENTS FOR HIERARCHIAL OLS REGRESSION MODELS PREDICTING ACCOMODATING PRACTICES (N = 772)**

Predictors	r	beta coefficients		
		Model 1 controls	Model 2 controls + HRM	Model 3 controls+HRM +compliance
<i>Controls</i>				
Organizational size <sup>a</sup>	.30**	.24**	.12**	.13**
Public sector <sup>b</sup>	.39**	.24**	.15**	.13**
Multiple workplaces <sup>b</sup>	.08**	.02	.02	.03
Overseas head office <sup>b</sup>	-.08**	.03	-.03	-.03
Controlled workplace <sup>b</sup>	.01	.10*	.06	.05
Decision-making autonomy	.03	.05	.04	.05
Mining <sup>c</sup>	-.07*	-.01	.03	.03
Electricity <sup>c</sup>	.04	.04	.05	.05
Construction <sup>c</sup>	.00	.06	.10**	.10**
Wholesale, retail <sup>c</sup>	-.15**	.01	.06	.04
Transport <sup>c</sup>	-.03	-.02	.01	.02
Communications <sup>c</sup>	.15**	.12**	.12**	.11**
Finance <sup>c</sup>	.02	.08*	.09*	.08*
Public administration <sup>c</sup>	.16**	.12**	.13**	.12**
Community <sup>c</sup>	.25**	.14**	.15**	.15**
Recreation <sup>c</sup>	-.05	-.02	.03	.03
Percent over 50 years of age <sup>d</sup>	.08**	.04	.05	.05
Percent migrants <sup>d</sup>	-.03	.00	-.01	-.02
Percent female	.14**	.14**	.12**	.11**
Time to learn job <sup>e</sup>	.12**	.08*	.03	.02
Percent managers promoted from within <sup>e</sup>	.03	.01	-.02	-.04
No. of unions <sup>f</sup>	.22**	.05	.01	.01
Advice from employee associations <sup>b</sup>	-.02	.04	.00	.00
Advice from consultants <sup>b</sup>	.09**	.06	.03	.02
<i>Human resource management (HRM)</i>				
Communications scale	.34**		.12**	.12**
Employee relations scale	.46**		.25**	.23**
Management strategies scale	.24**		.07*	.06
<i>Compliance</i>				
Procedural compliance	.31**			.10**
Adjusted R <sup>2</sup>		.27**	.35**	.36**
Change in R <sup>2</sup>			.08**	.01**

\* significant at the .05 level

\*\* significant at the .01 level

a Organizational size was collapsed into 6 categories: 100-150 = 1; 151-200 = 2; 201-300 = 3; 301-600 = 4; 601-1000 = 5; \_ 10001= 6.

b Dichotomous variable scored 2, other 1.

c The 11 ASIC categories were converted into 10 dummy variables, scored 0 and 1, with the largest category, manufacturing, being the omitted variable.

d This variable is collapsed into four categories assumed to behave as an interval scale.

e This variable is collapsed into six categories assumed to behave as an interval scale.

f The range of this variable is truncated at 16. Thus, if the number of unions exceeded 16, the variable is scored 16.

A hierarchical least squares regression model was used to identify the factors contributing to variation in the accommodating practices index (see Table 5). The same control variables as used in predicting procedural compliance were entered into the model on the first step. As was the case with procedural compliance, the control variables accounted for 27% of variance. The second block of variables added to the equation were the human resource management scales. They explained an additional 8% of variance. Finally, the regression model was extended to address the question of whether or not procedural compliance contributed to accommodating practices, once all other variables including those associated with human resource management were taken into account. When procedural compliance was entered into the equation, a further significant though small increase of one percent was obtained.

One interpretation of these findings is that procedural compliance accounts for a small proportion of variance because its effect is indirect. Procedural compliance increases commitment to human resource management strategies which, in turn, increases the number of accommodating practices in the workplace. This thesis was tested through a further regression analysis in which procedural compliance was entered into the regression equation after the control variables, with the human resource management variables added last of all. The results did not support the indirect effects interpretation. Procedural compliance explained an additional two percent of variance and the human resource management variables subsequently added a further 7%. These results are not markedly different from those reported above and presented in Table 5. When organizational and workforce characteristics are controlled, procedural compliance and human resource management contribute independently to accommodating practices, with human resource management being the more important.

From the beta coefficients in Table 5, the greatest number of accommodating practices were likely to be found in large organizations, in the public sector and in certain industries, specifically, finance, communications, construction, public administration and those providing community service. Of particular interest was the finding that the percent of women in the workforce was a stronger predictor of accommodating practices than procedural compliance. The higher the percentage, the greater the number of accommodating practices reported. It would be of interest to understand the direction of causality in this relationship. Do accommodating practices attract female employees or is a critical mass a precursor to action being taken? Finally, two human resource management variables made a substantial contribution. The first, employee relations, was also important in predicting procedural compliance. The second was the communications scale. Where the workplace allocated resources to improve communication, accommodating practices were more likely to be found.

## CONCLUSION

Data from two different sources converge in supporting an empirical relationship between procedural compliance with the Australian Government's affirmative action legislation and adopting practices that accommodate the needs of women in the workplace. Companies that have undertaken more steps are also the companies that have provided flexible work patterns, child care, permanent part-time work, and skills development programs.

While these data do not provide any basis for inferring cause and effect, one is tempted to conclude that the data are at least consistent with the theory behind the framing of the legislation. The intention of the Affirmative Action Act was to bring about change in work practices through facilitating employers' self-awareness of the way in which sex discrimination operated in the workplace. The eight steps were the keys to the doors of enlightenment. When the relationship between procedural compliance and accommodating practices was examined against the backdrop of other organizational and workplace variables, however, a somewhat different picture emerged of the process by which change was taking place.

From the regression analyses, organizational and workforce characteristics were important in predicting both procedural compliance and accommodating practices. Further research is required to understand the degree to which these differences are due to willingness or capacity to implement the legislation. When the organizational and workforce variables were controlled, commitment to human resource management remained important in accounting for the progress that had occurred over the first five years of the operation of the Act. Human resource management played a significant role in predicting both procedural compliance and accommodating practices. Both were higher in companies which had strong human resource management programs in place. Where companies had little time for human resource management, procedural compliance was low as were the accommodations made for women in the workplace.

Of particular interest was the way in which the three aspects of human resource management represented in this paper correlated positively with EEO/AA activities. While the "soft" version captured by the employee relations scale was the dominant predictor, support for EEO/AA came from advocates of the "hard" version as well. Furthermore, the soft and hard versions are practiced more often together than apart. In some quarters there appears to be genuine acceptance that EEO/AA is not just a social justice issue, but also a means for gaining competitive advantage and fully utilizing available talent.

From the perspective of the Affirmative Action Agency, these findings are not surprising. Confronted with a hostile business community that was opposed to anything being mandatory and a piece of legislation that had very little in the way of teeth, the Agency had to find a means of selling EEO/AA law and practice to the Australian business community. Thus, EEO/AA has become synonymous with "best practice". Through choosing human resource management as the horse to pull the legislative cart, the Affirmative Action Agency was able to preserve consensus and move forward.

Yet there are warnings in these findings for the future. Companies that do not place value on HRM or personnel functions are at risk of being left untouched by the legislation. These are the companies that are most likely to be doing the absolute minimum; that is, assigning responsibility to someone in the company, writing out a policy statement, submitting a report containing some numbers of dubious worth and forgetting all about it for another year. When there is no valued organizational function to which EEO/AA can be attached, the legislation assumes low priority and little change can be expected to take place. The analyses suggest that such problems are exacerbated by organizational characteristics. Private sector independently operated workplaces have yet to be persuaded of the value of EEO/AA administrative procedures while small private companies lag behind in adopting accommodating workplace practices.

These data also raise concerns about the central thesis that if workplaces are forced to monitor and evaluate their own performance with regard to women's employment, they will remove discriminatory practices. First, this state of self-awareness does not appear to be a readily attainable goal. The steps that are crucial to coming to terms with one's own discriminatory practices are consultation, setting forward estimates, monitoring and evaluation. These were the steps that business units were least willing to engage in. Second, the findings are not particularly encouraging for the thesis that procedures geared to raising self-insight will result in changes to workplace practice. When all other variables were controlled, the level of procedural compliance had only a very small effect on the number of accommodating practices that had been put in place. Possibly this reflects the relatively short time that has elapsed since the legislation was introduced. The more likely explanation, however, is that recognizing a problem does not provide the necessary know-how for fixing it.

Supporting this argument is the finding that an important predictor of changing workplace practices was the human resource management scale, communications. This result suggests that if change is to occur at the coal face, the organization must devote resources to building a good communication network where information and feedback flow readily and easily from one group to another. The know-how for fixing problems can lie in the organization itself as long as appropriate mechanisms are in place for dialogue between groups and joint problem solving. Beyond that, these data suggest that the role that the Affirmative Action Agency is beginning to play in providing models for different industry groups (Affirmative Action Agency, 1992) will be important in ensuring that procedures of self-analysis are followed up by changes in practice.

The final point for discussion is whether the Affirmative Action Act has had any effect on workplace practice or would these changes have taken place in any case through human resource management programs. To dismiss the legislation as ineffective at this point is premature. The legislation takes us on a complex, slow and subtly marked path to social change. As both Ronalds (1987) and Pratt (1991) have argued, its effectiveness cannot be properly judged within 10 years of its operation.

In the meantime, there are reasons for optimism. When large scale social change is the desired goal, redundancy in the messages from society's major institutions is advantageous. As noted earlier in the paper, the accommodating practices that were being adopted by business were being recommended not only by the Agency, but were being demanded in the social and political domains as well. Similarly, human resource management should not be seen as an alternative, but rather as an organizational support structure for EEO/AA legislation.

Furthermore, human resource management programs operate in organizational contexts that carry with them the values and prejudices that pervade the culture. Human resource managers, like all managers, need to be given a looking glass so that they can see their own prejudices standing in the way of the development of talent and commitment. The Affirmative Action (Equal Employment Opportunity) Act provides such a looking glass. The legislation signals to business, women, and the community at large that there is no place for discriminatory practices at work. As pressure continues to mount from social and political sources, the Affirmative Action Act is playing its role in giving Australian companies direction to contribute

to social justice and improve their social and economic standing in the community at the same time.

## REFERENCES

- Affirmative Action Agency (1992) *Quality and commitment: The next steps*, Final Report of Effectiveness Review of Affirmative Action Act 1986, Canberra: AGPS.
- Affirmative Action Agency (1990) *Taking steps: Employers' progress in affirmative action*, Canberra: AGPS
- Affirmative Action Agency (1988-91) *Annual Reports*, Canberra: AGPS.
- Australian Bureau of Statistics (1993) *Women in Australia*, Cat. no. 4113.0.
- Baxter, J. and Gibson, D (1990) *Double take: The links between paid and unpaid work*, Canberra: Australian Government Publishing Service.
- Braithwaite, V. (1992) First steps: Business reactions to implementing the Affirmative Action Act, report to the Affirmative Action Agency, Research School of Social Sciences, Australian National University.
- Burton, C. (1991) *The promise and the price: The struggle for equal opportunity in women's employment*, Sydney: Allen & Unwin.
- Callus, R., Morehead, A., Cully, M. and Buchanan, J. (1991) *Industrial relations at work: The Australian Workplace Industrial Relations Survey*, Canberra: Australian Government Publishing Service.
- Cohen, Y., & Pfeffer, J. (1986) Organizational hiring standards, *Administrative Science Quarterly*, 31, 1-24.
- Donabedian, A. (1966) Evaluating the quality of medical care, *Milbank Memorial Fund Quarterly*, 44, 166-206.
- Edelman, L.B., Petterson, S., Chambliss, E. & Erlanger, H.S. (1991) Legal ambiguity and the politics of compliance: Affirmative Action Officers' dilemma, *Law and Policy*, 13, 73-97.
- Game, A. and Pringle, R. (1983) *Gender at work*, Sydney: George Allen & Unwin.
- Guest, D. (1987) Human resource management; a new opportunity for psychologists or another passing fad? *The Occupational Psychologist*, no. 2.
- Keep, E. (1987) Britain's attempt to create a national vocational, educational and training system: a review of progress, *Warwick Papers in Industrial Relations*, no. 16, Coventry: University of Warwick.
- Legge, K. (1989) 'Human resource management: A critical analysis', in J. Storey, *New Perspectives on Human Resource Management*, London: Routledge.
- O'Donnell, C. (1984) *The basis of the bargain: Gender, schooling and jobs*, Sydney: George Allen & Unwin.

- O'Donnell, C and Hall, P. (1988) *Getting equal: Labour market regulation and women's work*, Sydney: Allen & Unwin.
- Pratt, V. (1991) *A chance to have a say: Women and employment*. A joint seminar of the House of Representatives Standing Committee on Legal and Constitutional Affairs and the Women's Bureau of the Department of Employment, Education and Training pp 6-15.
- Poiner, G and Wills, S. (1991) *The gifthorse: A critical look at Equal Employment Opportunity in Australia*, Sydney: Allen & Unwin.
- Rimmer, S. (1991) Occupational segregation, earnings differentials and status among Australian workers, *Economic Record*, September, 205-216.
- Ronalds, C. (1987) *Affirmative action and sex discrimination: A handbook on legal rights for women*, Sydney: Pluto Press.
- Sawer, M. (1990) *Sisters in suits: Women and public policy in Australia*, Sydney: Allen & Unwin.
- Storey, J. (ed.) (1989) *New perspectives on human resource management*, London: Routledge.
- Thornton, M. (1990) *The Liberal promise: Anti-discrimination legislation in Australia*, Melbourne: Oxford University Press Australia.
- Torrington, D (1989) Human resource management and the personnel function, in J. Storey (ed), *New perspectives on human resource management*, London: Routledge.
- Torrington, D. & Hall, L. (1987) *Personnel management: A new approach*, London: Prentice Hall.
- Victorian Trades Hall Council (1992) *Making Affirmative Action Work*. Melbourne: Victorian Trades Hall Council.
- Walby, S. (1988), *Gender segregation at work*, Milton Keynes: Open University Press.

# Workplace Productivity and Joint Consultation

Michael J Alexander and Roy Green

## INTRODUCTION

Over the past decade, Australia has taken steps to reduce its traditional reliance on tariff protection for manufacturing industry. Significantly, as the economy was opened up to international competition, public debate shifted to the issue of productivity and performance at the workplace. While there is now widespread agreement that workplace productivity must be improved if Australian firms are to compete effectively, there is as yet no agreement on what is *meant* by workplace productivity and how it should be measured, let alone improved. This stems largely from a lack of understanding of the nature of the production process and, consequently, of the underlying mechanisms which lead to higher productivity at the workplace.

One of the least understood aspects of the production process is how different workplace environments, and the different ways workers and management interact, affect the amount and quality of the output finally produced. There are many factors which operate to determine the productivity of a workplace, but it is the role played by workers and trade unions in the production process and their relationship with management, which is often seen as the most significant.

Hence, our aim in this paper is to examine the role of workers and unions in the process of productivity improvement, first, by evaluating the theoretical analysis and empirical studies undertaken in this area and, then, by looking specifically at the effects on performance of the establishment and operation of joint consultation arrangements between management and workers in a representative sample of Australian workplaces.

In the first section of the paper, we examine the two broad theoretical approaches taken to the role of workers and unions in the literature and assess their validity in

the context of the workplace productivity debate. In the 'traditional' or neoclassical approach, the emphasis of productivity research has been upon attributing improvements in productivity to the physical amounts of the inputs employed - the number of workers and machines -together with the technology that is embodied in the inputs.

Here, production is treated as an 'engineering blueprint', where inputs are combined in certain quantities so that a designated amount of output may be produced. We include in the traditional approach the recent work of the Harvard School, which makes an ambitious attempt to accommodate different workplace environments, but only within the neoclassical theory of the firm.

The 'alternative' approach, developed in parallel by the Industrial Relations Research Unit at Warwick and the Sloan School of Management at MIT, has its origins in institutional economics, industrial relations and even, to a degree, in classical economics. The emphasis here, by contrast, is on the *process* by which inputs are transformed into outputs at the workplace, and the *interactions* within that process, rather than simply the outcome of a production function.

In particular, there is an explicit recognition that the amount and quality of the labour effort provided by workers is not predetermined at the time the employment contract is entered into, and that management will vary the workplace environment in order to maximise productivity. A central hypothesis of this approach is that higher workplace productivity is associated with greater 'intensity' of joint collaboration between management and workforce.

The second section of the paper is an attempt to test and apply this hypothesis using Australian survey evidence. We undertake an empirical analysis of the forms and intensity of collaboration between management and workers in the production process, primarily in the context of joint consultation arrangements, and the effects on workplace productivity and performance. The analysis is based on the large and comprehensive data set generated by the Australian Workplace Industrial Relations Survey (AWIRS), which was conducted in 1989/90 by the federal Department of Industrial Relations.

The purpose of this analysis is to ascertain the main characteristics of the process of interaction between management and workers which have a significant measurable impact upon workplace performance. In order to achieve the most accurate and revealing result, performance in the analysis is measured not by a narrow productivity ratio, but by a range of 'performance indicators', including improvements to productivity and efficiency, the ability to introduce change, management-employee relations and output quality.

In the final section, we draw together our conclusions for the 'best practice'

implementation of joint consultation arrangements in Australia in the light of both the theoretical analysis and modelling of the AWIRS results.

## THEORETICAL APPROACHES

Previous work dealing with the role of workers and trade unions in determining workplace productivity can broadly be divided into two theoretical approaches, which we will term the 'traditional' and 'alternative' approaches. To begin with, in the traditional or neoclassical approach, where prices are determined simultaneously in all commodity markets (including for factors of production such as labour), productivity is a purely technical relationship specified by the characteristics of a production function. There is no explicit analysis of the underlying *process* of production itself, and indeed there is no need for one, since it is made redundant by a number of key assumptions within the neoclassical model about the nature of the employment relationship.

Hence, the employment contract in the traditional approach, rather than providing an employer with control over the employee's *capacity* to work - as most industrial relations studies would suggest - specifies the *actual amount* of labour to be performed, like the terms of sale for any other commodity. All aspects of the employment relationship, including the amount of effort to be expended, are known to both parties at the time of the exchange.

Problems such as how management can extract a sufficiently profitable level of work effort from their workforce are not examined in this approach, and nor is the role of conflict within the employment relationship, since the labour contract is perceived to be one of mutually harmonious exchange. The workplace environment and the way in which work is structured and organised are not seen as variables in the determination of workplace productivity, but are simply the backdrop against which more critical decisions about inputs and technology are made.

For the most part, the role of trade unions is also subsumed within the fixed backdrop which makes up the workplace's industrial relations environment (see Green 1990). Whenever the traditional approach is used to analyse trade unions explicitly, the model is of a *monopoly* provider of labour services which uses its market power to impede the proper functioning of the market in the interests of its members. In this model, unions are characterised as the aggregated preferences of their individual members, and they are presumed to maximise some objective function, whose main determinants are wage levels and employment, with the implication that one must be traded off against the other.

As the traditional approach was subjected to increasing criticism for being unrealistic, subsequent analysis of trade union behaviour led to the development of

models that were based not only upon neoclassical axioms of rationality, but also the well documented empirical observations in the industrial relations literature (see Oswald, 1985, for a survey). However, although these models have attempted to incorporate a number of *stylised* facts, the incorporation of industrial relations research, in our view, is purely *ad hoc*. They are still exclusively concerned with exchange relations and fail to integrate theoretically the social aspects of the production process and employment relationship (Turnbull 1988).

For example, academics at the Harvard School of Economics expressed their dissatisfaction with the prevailing economic rationale for unionism and its perceived negative impact on workplace performance by developing the Collective Voice/Institutional Response (CV/IR) model of unionism (Brown and Medoff 1978, Freeman and Medoff 1979). Here, unions were seen to provide a number of positive attributes for firms which, in a cooperative environment, led to a firm achieving a *higher* level of productivity than it would otherwise. The Harvard School supported their hypothesis by using a production function approach which differentiated between unionised and non-unionised labour (Freeman and Medoff 1984). While they found that unionised firms had higher productivity, their approach and interpretation of their results have been questioned (Addison and Barnett 1982, Addison and Hirsch 1989, Hirsch and Addison 1986).

The higher productivity performance is basically achieved in the CV/IR model through the mechanism of collective voice, whereby dissatisfied workers can, through their union, voice their grievances with management without fear of reprisal. It also allows management to introduce their own changes more easily by having to deal only with a small number of union representatives, rather than the entire workforce. Overall, the model is an attempt to bring the industrial relations climate at the workplace explicitly into the analysis, because it is seen as an important factor in a workplace's performance, and not just part of the backdrop.

Ironically, it is the application of the Harvard approach to the British economy which has been used to justify a sustained attack on trade union power by the 1980's Conservative government (Metcalf 1989a, 1989b, 1990). This is a position which, in academic circles, largely emanated from the London School of Economics (LSE). The claim was made that research over the past decade on trade unions now made it possible "to tell an entirely consistent story - based on hard facts - about what unions do" (Metcalf 1989b: 21). Metcalf purported to show that the overwhelming weight of evidence pointed to a negative impact of unions on the economic performance of firms, which was in contrast to the positive impact reported in many of the studies from the United States (see Alexander and Green 1992, for a full discussion of these issues).

The underlying tenet of the LSE contribution to this debate is that the poor performance of British industry for most of this century is attributable to the

attitudes and activities of British workers and their unions, and that the results of recent analysis simply reinforce this long held belief. However, when the argument was closely examined, little hard evidence was found in its support (Nichol 1986). Indeed, Metcalf's recent presentation of this argument has been criticised for its liberal interpretation, and even misinterpretation, of "the facts" (Nolan 1989, Nolan and Marginson 1990).

There is a further, more fundamental criticism of the Harvard School approach. Despite attempts to incorporate the nature and characteristics of the industrial relations environment within the determinants of workplace productivity, all the Harvard School approach has achieved is to provide us with some empirical evidence that unionised enterprises sometimes have higher levels of productivity than their non-union counterparts. Although not a trivial contribution, its methodology of distinguishing between union and non-union labour within a production function approach does not adequately explain or capture the *mechanisms* by which labour relations impact on the productivity of a workplace.

In addition, there is an underlying assumption that higher productivity is associated with good industrial relations which in turn is associated with the interests of workers coinciding with those of the firm. In advocating a positive role for unions, therefore, the Harvard model sees collective voice as a means of increasing the likelihood of these associations, given the prospect that working together enables greater profits to be earned and subsequently divided amongst the competing groups. However, the model fails to recognise that

'Improvements' in productivity invariably come about through a variety of processes involving deskilling, work intensification, increased effort, or outright job loss, all of which can invoke worker and/or trade union opposition in some shape or form. The *process* through which such changes are brought about, and the extent to which they engender conflict, or undermine the scope for compromise, is thus a *principal determinant* of the rate of growth of productivity and the precise path along which productivity enhancing changes are introduced. (Turnbull 1989: 6, our emphasis.)

Studies adopting an 'alternative' approach to the traditional one start by recognising that the amount of productivity flowing from the employment contract cannot be determined at the time it is entered into, since the contract is for control over the *capacity* to perform labour rather than a specific amount of labour effort (Brown and Nolan 1988). This 'open-ended' nature of the employment contract means that employers will spend much time and effort "constructing an institutional context in which employees can be motivated (or, as some would prefer to describe it, controlled) so as to work with the effort, care, compliance, flexibility, or whatever, that enhances their productivity" (Brown and Nolan 1988: 344).

In contrast with the passive industrial relations role usually ascribed to the firm in the traditional approach, the recognition of pro-active behaviour by firms to raise and sustain the productivity of labour was first introduced as 'productivity bargaining' by Flanders (1964) and then McKersie and Hunter (1973)<sup>1</sup>. More recently, Kochan, Katz and McKersie (1986) have developed the idea that the industrial relations environment at any workplace, far from being given, is in fact an explicit *strategic* variable upon which firms decide. 'Best practice' firms will consciously structure workplace relations in an effort to achieve "higher productivity, lower unit costs, and improved profitability" (Kochan, McKersie and Capelli 1983: 20). It is therefore argued that "to neglect the precise character of these relations as the Harvard School [and others] do is to ignore not only an important source of productivity variation but also the key processes through which trade unions effect productivity outcomes" (*ibid*: 7).

In the alternative approach, explicit examination of industrial relations strategy becomes the *major* focus for explaining the variation in performance observed between workplaces, at least when the technological conditions of production are the same. Having recognised the open-ended nature of the employment contract, this approach focuses the analysis upon both the *processes* of production and the everyday *interactions* between management and workers in the firm's attempt to improve its performance. Although these processes and interactions will cover a range of issues, such as training, work organisation and job design, all of which affect performance in some way (Daly, Hitchens and Wagner 1985), we are interested here in the impact of joint collaboration at the workplace.

The main thrust of Kochan, Katz and McKersie (1986) is to address the large increase in 'collaborative' schemes and structures by US firms over the past decade, which have been developed as a strategy to regain the competitive edge lost to international rivals. In examining the effects of some of these schemes, Cooke (1989, 1990) recognises that the employment relationship is "characterised by an inherent conflict of interest" (Cooke 1989: 301) and that both management and unions have the ability to exercise their relative power in order to improve or defend their current rewards from the employment relationship. However, in order for both unions and management to agree to collaborate, they must both perceive that this will provide them, as separate groups, with more rewards than if they were to rely *only* upon their relative power.

In Cooke (1989), the performance of the firm, measured by improvements to both productivity and product quality, is shown to be affected by the 'intensity' of collaboration, the cooperative or adversarial nature of labour-management relations, and management's exercise of its relative power options. Increased intensity, cooperative relations and a resistance to the exercise of relative power were all

1

Earlier attempts at 'productivity bargaining' in the US were based on the growth of labour productivity at the macro level rather than at the micro level of the company and workplace (Katz 1985).

associated with improved performance. In Cooke (1990), improved labour-management relations (assumed to be associated with improved performance) were themselves linked to an increase in the intensity of collaborative activities and restraint by the parties in exercising their relative power options.

In a similar fashion, Cutcher-Gershenfeld (1991) recognises that within different aspects of the employment relationship, conflict and cooperation will be operating simultaneously. In this sense, management and workers are seen as bringing "a mixture of common and competing interests" to the employment relationship. Consequently, economic performance is influenced both "by the way conflicts are resolved" and "by the way common concerns are pursued", with the activities in one sphere reinforcing or undermining activities in the other. Thus, to examine the links between industrial relations and economic performance, we need to focus on the *patterns of interaction* which occur at the workplace.

It is the focus of the alternative approach on the process of production and the interactions between management and workers at the workplace which motivates our examination of collaborative schemes in Australian workplaces. This approach is concerned with the open-ended nature of the employment relationship and the consequent imperative for management to raise and sustain the level of productivity. To this end, firms will experiment with various methods of structuring the employment contract and the way work is organised and carried out, which, in turn, have far reaching consequences for the industrial relations environment and the structure of the labour market.

The key hypothesis of Cooke and Cutcher-Gershenfeld, therefore, is that economic performance can be improved if firms introduce coherent joint decision-making programs, and ensure that the intensity of the program is sufficiently high and representation of workers sufficiently strong for the program to maintain credibility. Notions of trust and commitment seem to be important reinforcing mechanisms for such programs, with breaches having negative consequences. Indeed, it is the mutually reinforcing character of industrial relations measures which supports the emphasis throughout our discussion on workplace interaction as a key variable in its own right.

## EFFECTS OF JOINT CONSULTATION

We now turn in the empirical section of the paper to an assessment of the impact on the productivity and performance of Australian workplaces of the introduction of joint consultative arrangements, in which we include Joint Consultative Committees (JCC), Quality Circles (QC) and Productivity Improvement Groups (PIG). We are not interested here simply in the *presence* of such arrangements, as in the mechanistic model of the traditional approach, but rather in the *characteristics*

which affect workplace productivity, in particular those which indicate the intensity of joint collaboration between management, unions and workforce. In other words, we 'go behind' the consultative arrangements and test the argument of the alternative approach that it is the processes and interactions at the workplace which matter in the determination of productivity, when the state of technology is given.

Similarly, our approach to measuring productivity is not to calculate a production function and test its results against these characteristics of the consultative arrangements, but to define a broader measure of productivity, based upon the notion of 'performance indicators', which captures the goals and activities of individual workplaces (see Green 1992). In addition to measures of productivity and efficiency, therefore, the criteria for the success of these arrangements in our analysis include whether they lead to improved product quality or better employee relations or make it easier to introduce change in the production process.

The analysis which follows draws upon the results of the first Australian Workplace Industrial Relations Survey (AWIRS), conducted by the federal Department of Industrial Relations in 1989/90 using a weighted sample of 2004 workplaces in the public and private sectors. The survey results are derived from interview-based questionnaires directed to General Managers, Employee Relations Managers and Union Delegates at each workplace in the sample.

### *The Model*

Our model of joint consultative arrangements, consistent with the emphasis on characteristics of these arrangements rather than their presence alone, incorporates key features of their process of establishment, history and day-to-day operation. The information for the model is derived from Section H of the AWIRS *Employee Relations Management Questionnaire* (ERMQ), which covers 'Management and Employee Communication'. Once it is established, according to the response to Question H.1, that a JCC, QC or PIG scheme exists at the workplace<sup>2</sup>, the rest of Section H elicits information about the nature and operation of the scheme, including whether it has led to any improvements in key areas of workplace performance. We have matched four different measures of success to the information on the operational features of the scheme, using a logistic regression, in order to determine the crucial factors in any positive effect on performance.

Workplace performance can be measured in a wide variety of ways, all of which will be directly or indirectly related to one another and which will ultimately determine the success of workplace strategy. In this analysis, we use the assessment of Employee Relations Managers (ERM) of the joint consultation scheme's ability to make a positive impact on four different indicators of workplace performance.

2

In Question H.1 from ERMQ, the presence of a QC or PIG is not determined separately but rather lumped together, so a yes response could mean either, or both. However, the presence of a JCC is determined separately.

These four indicators are<sup>3</sup>:

- (1) improvements in productivity or efficiency
- (2) making it easier or quicker to introduce change
- (3) improvements to management-employee relations, and
- (4) improvements to product or service quality.

The yes/no responses to these four questions are the dependent variables in our equations, against which we regress the same group of establishment and operational explanatory variables. It should be noted that these questions are chosen deliberately in preference to the productivity question in the *General Management Questionnaire* for reasons we have discussed elsewhere (Alexander and Green 1992).

The explanatory variables are derived from another part of Section H. They are questions relating directly to the consultative schemes asked about in Question H.1. They are taken from, or are modifications to, Questions H.12 to H.26, except for H.23, which is not used, and H.25 which provides the dependent variables for the regressions. (A copy of the questions in Section H of the ERMQ is reprinted in Appendix B.) These questions are ideal for our purpose because they address the establishment and operational aspects of the schemes, which in turn allow us to determine which of these aspects contribute to the scheme's success.

The 30 explanatory variables used in the regressions are divided into ten areas, each broadly corresponding to a different question from the survey<sup>4</sup>. Each of the ten areas attempts to capture some aspect of the processes involved in establishing the consultative scheme, the history and motivations behind its establishment or the interactions and features of its day-to-day operation. Table 1 shows how the dependent and explanatory variables are operationalised.<sup>5</sup>

### *The Data*

From the AWIRS sample of 2004 workplaces with 20 or more employees, 402 workplaces had ongoing formal JCCs while 297 had QCs or PIGs. Of these workplaces, 115 had both a JCC and a QC or PIG, providing us with 584 workplaces which had either a JCC or QC/PIG or both. The questionnaire was structured so that if both types of schemes were present, questions were asked about the JCC in preference to the QC/PIG. This provided us with an initial set of

<sup>3</sup> These assessments are recorded at Question H.25 of the ERMQ. Question H.25 also asked whether labour turnover had improved as a result of the scheme. This is not included in the analysis because labour turnover is symptomatic of the conditions within the firm rather than a direct causal indicator of economic performance. In the context of our argument, it has a second order of importance.

<sup>4</sup> Questions H.12 and H.13 are grouped together since they ask the same information for different employee groups. Likewise, Question H.19 is concerned with more detailed information about the opposition referred to in Question H.18, while Questions H.20 and H.21 are both concerned with the composition of the scheme.

<sup>5</sup> All tables are shown in Appendix A.

584 observations, 402 based on JCCs and 182 based on QCs or PIGs.

Next, 18 of these observations had to be deleted from the data set due to missing values on some of the explanatory variables. Of those deleted, 13 workplaces did not know how many times the scheme's committee had met over the past year (MEETINGS), 2 workplaces did not know how long the scheme had been in operation (LENGTH) and 3 workplaces did not record what percentage of non-managerial workplaces were covered by the scheme (REP\_NMAN)<sup>6</sup>. This left 566 unweighted observations from which the regressions could be performed.

The AWIRS data base has an over-representation of large workplaces compared to the true population of workplaces, and so the observations used in the regressions are weighted in order that they reflect this population. When this is done, the weighted observations sum to just over 456. This number is smaller than the unweighted observations both because large workplaces are over-represented in the AWIRS data base and because JCCs and QC/PIGs are not distributed randomly across all workplaces, but are more prevalent in these large workplaces.

Tables 2 and 3 provide some summary statistics on the dependent and explanatory variables used in the regressions. As shown in Table 3, the (weighted) yes response on the four indicators of performance out-number the no response by at least two-to-one. Interestingly, the area most likely to have seen improvement following the introduction of a JCC or QC/PIG was management-employee relations while the least likely was product or service quality.

### *The Results*

Four separate regressions were performed, each using one of the four indicators of performance as a dependent variable but maintaining the same explanatory variables in each regression. The regressions were performed using the LOGISTIC procedure from the SAS computer package. The results of these regressions are presented in Table 4.

In addition, Table 5 provides estimates of the impact of each of the significant explanatory variables on the *probability* of a specific performance indicator having improved as a result of the scheme. To determine the impact of each significant variable, we calculate the expected (or fitted) value of the regression, also called the expected *log odds ratio*, for each of the possible values of the significant variable<sup>7</sup>. In this calculation, the other explanatory variables take their (weighted) mean value. This fitted value provides the expected logit which can be converted into an expected probability by the following equation:

<sup>6</sup> Two of these three also did not know what percentage of managerial employees were covered by the scheme.

<sup>7</sup> Besides LENGTH and MEETINGS, all the remaining significant variables are dummy variables and will only take the value 0 or 1. For LENGTH and MEETINGS we have chosen three realistic values.

$$Prob = \frac{e^{\text{logit}(p)}}{(1 + e^{\text{logit}(p)})}$$

where  $\text{logit}(p)$  is the fitted value of the regression

To take an example, Table 5 indicates that when holding all other variables at their mean value, a change in the value of CONS\_EMPL from 0 to 1 increases the probability that the scheme 'improves the level of productivity or efficiency' at the workplace from 0.739 to 0.862, or increases the probability that the scheme 'improves the product or service quality' from 0.753 to 0.847.

Care needs to be taken in the interpretation of these probabilities because their values are highly dependent upon the values of the other variables. The logistic regression provides a *linear* relationship between the explanatory variables and the *logit* (or log odds ratio) of the dependent variable. However, as the above equation indicates, the relationship between the explanatory variables and the probability of a yes response on the dependent variable is *non-linear*.

Consequently, when we change the value of one of the explanatory variables in the regression from 0 to 1, holding the values of all other explanatory variables constant, the resulting change in probability will depend upon which position on the logistic distribution those other explanatory variables have placed us. In other words, the change in the probability is not independent of the values of the other explanatory variables. For any given change in the value of the logit, the equivalent change in the probability will be greater if we are in the middle of the logistic distribution than if we are more toward one of the tails.

The approximate position on the distribution that each regression impacts is given by the last line in Table 5. It shows the probability of a yes response for the dependent variable if *all* the explanatory variables take their (weighted) mean value. From the high probabilities shown, all four regressions are situated toward the right-hand tail of the logistic distribution, particularly the regression for management-employee relations. However, this is not a problem since it is the relative change within any one regression in which we are interested, since this allows us to consider which of the explanatory variables has the most significant impact in the probable success of the consultative scheme.

Overall, the fit of our model across all four regressions is reasonably good. Regression 4 is the best fitting of the regressions as shown by the value of the  $\chi^2$  and the large number of significant variables, while regression 3 has the poorest fit.

One of the issues that our model allows us to consider is whether the initial objectives of management in setting up a collaborative structure are, in fact, compatible with each other. In all four regressions, the objective which coincides

most closely with the issue behind the dependent variable<sup>8</sup> is significant and positive, indicating that a consultative scheme will induce an improvement in a performance indicator, provided that such an improvement is a clear goal of the scheme.

There is also evidence that schemes which 'improve productivity or efficiency' will also lead to an improvement in 'product or service quality'. In regression (1), the objective of improvements to the 'quality of the service/product' (OBJ\_QUALITY) is significant and positive. The same is true of the 'improve efficiency' (OBJ\_EFFCNCY) and 'improve productivity' (OBJ\_PRODV) objectives in regression (4), suggesting that the joint objectives of OBJ\_EFFCNCY, OBJ\_PRODV and OBJ\_QUALITY can be successfully achieved from the same scheme.

Indeed, similarities across the whole of regressions (1) and (4) lends more weight to this point. Of the six significant variables in regression (1), and 12 significant variables in regression (2), five are significant in both and of the same sign. Of the balance which only have a significant variable in one regression or the other, the sign on the coefficients is still the same (although not significant).

However, at the same time, evidence suggests that schemes which have improvements in the above two performance indicators as their objective may not be compatible with schemes which are successful at 'making it easier to implement change', and *vice versa*. In regression (2), the objective 'to improve productivity' (OBJ\_PRODV) is significant and *negative*, while in both regressions (1) and (4), the coefficient on the objective 'to assist in implementing change' (OBJ\_IMPCHNG) is *negative*, although it is only significant in regression (4).

This would suggest that schemes which are successful at improving productivity/efficiency and improving product/service quality will not be so successful in making it easier to implement change, and *vice versa*. At first glance, this would seem to be a somewhat perverse result, given that improvements in output quality or productivity are usually associated in the literature with the ability to implement change and *vice versa*.

However, given that it is the ERM's interpretation of events which the survey is capturing, the manner in which they have interpreted the meaning of 'change' in this question will be crucial. It is longer term structural change, through the introduction of new technology and new methods of production, which has the potential to improve productivity and output quality. If ERMs have interpreted change to mean an increase in managerial prerogative, such as the ability to make short term cost-cutting changes to employment and work practices, then such changes could

8

The survey makes a distinction between efficiency (OBJ\_EFFCNCY) and productivity (OBJ\_PRODV) in its objectives, although they are combined in the dependent variable of regression (1). While OBJ\_EFFCNCY is not significant, its coefficient is still positive. Moreover, the objective which coincides most closely with 'improved management-employee relations' is 'to increase communications' (OBJ\_COMM).

*undermine* in advance any strategy of increasing long term dynamic efficiency<sup>9</sup>. In other words, a short term interpretation of 'change' may not be compatible with the long term objectives of improved productivity/ efficiency or product/service quality.

So far, we have indicated the problems associated with a scheme whose objectives are in conflict with one another, leading to a reduced probability of success. Such internal incompatibility can also be a problem in the context of the day-to-day operations of the scheme. A significant example may be found in the results from regressions (1) and (2), which suggest that if the scheme has the authority to deal with issues of 'pay and conditions' (PAY&COND), then the relevant performance indicator is less likely to be improved as a consequence of the scheme.

Traditionally, pay and conditions are dealt with through negotiation between management and unions, with each taking an initial adversarial position. However, this adversarial approach is at odds with how a JCC or QC/PIG should operate, and thus creates a potential contradiction within the scheme as far as its aims and functions are concerned. The objective of increasing productivity requires an environment of cooperation and the identification of joint interests, whereas the settling of disputes about pay and working conditions requires the exercise of relative power by both parties, which often provokes antagonistic relations. The resultant incompatibility is reflected in the significantly negative coefficient of PAY&COND.

We do not wish to enter the debate about whether joint consultation arrangements undermine or complement wage bargaining at the workplace (Marchington 1987). Our results simply reinforce the point made by Cutcher-Gershenfeld (1991) on the importance for management to clearly recognise and address the aspects of conflict and cooperation which exist simultaneously within the employment relationship. It is often the case that the interests of workers and employers do not coincide, even in an environment of 'good' industrial relations. The challenge for management is to establish institutional structures which are able to delineate, and provide for continuing resolution of, the areas of conflict within the relationship, so that the joint benefits from consultation and cooperation may be developed in a relatively unimpeded fashion.<sup>10</sup> Failure to do so runs the risk of compromising the consultation process because of the self-reinforcing nature of industrial relations variables.

This brings us to the question of the intensity of the consultative process. Just as this is seen in the literature to be of major significance for the success of any scheme, so

---

<sup>9</sup> The significance of the role of the Industrial Relations Commission in promoting dynamic efficiency changes as against short term cost focused measures is detailed elsewhere in the context of the AWIRS results (Green and Macdonald 1991).

<sup>10</sup> These results are consistent with Marchington's recent work on the impact of JCCs in Australian workplaces. He found that trade union delegates were highly positive about the impact of the JCC and its operation, but "were particularly negative if the major content of JCCs was working conditions" (Marchington 1992: p.23).

it would seem also to be the case for Australian workplaces. Our most direct measure of intensity may be derived from the number of meetings of the scheme in the previous year (MEETINGS), which has a significantly positive coefficient in all but the regression on management-employee relations. Its largest effect is in the scheme's influence on improved output quality (regression 4).

The increased frequency of meetings can be seen as having a beneficial effect for two reasons. First, problems and issues are more likely to be addressed as they arise, when they are fresh in the minds of those whom they affect; and secondly, greater frequency requires an increased level of preparedness on the part of those participating and, ultimately, increased commitment to the consultative process.

It might further be argued that commitment to the process of consultation or joint problem-solving is just another aspect of the intensity of the process. A factor in that commitment is management's willingness to negotiate at all stages of the scheme's introduction. Indeed, we would expect greater commitment to the scheme by all parties, and therefore an increased chance of its success, if management were prepared to negotiate with all those groups who are to be affected by the scheme prior to its introduction.

From Table 2, we see that management had prior negotiations with 'the employees most affected' (CONS\_EMPL) and 'first-line supervisors/line management' (CONS\_FLSUP) in just over 50 per cent of cases where a scheme was introduced. This would seem a little lower than expected. In the case of 'workplace union representatives' (CONS\_WPUN) and full-time 'union officials' (CONS\_UNOFF), the percentages were only 31 and 25 per cent respectively.

The regression results indicate that prior consultation with 'the employees most affected' (CONS\_EMPL) is a very significant determinant of the success of the scheme for all four performance indicators, but most strongly in the cases of 'improved productivity or efficiency' and 'improved management-employee relations'. Although this is a result which might be reached intuitively, or through anecdotal evidence, the fact that CONS\_EMPL is the *only* variable which is significant in all four regressions indicates with little room for doubt its central importance to the success of consultative schemes. Surprisingly, though, prior consultation with first-line management (CONS\_FLSUP) was only significant in regression (4), where it had a larger effect than CONS\_EMPL.

As for prior consultation with 'workplace union representatives' (CONS\_WPUN) or full-time 'union officials' (CONS\_UNOFF), only the latter provided any significant coefficients, that being a negative effect in regression (2). It may be tempting to accept the conclusion at face value that consulting with union officials outside the workplace, by contrast with workplace union representatives, is detrimental to the performance of the workplace. However, there is no evidence of

this in the other three regressions. Instead, the answer may be found in the previous discussion on the compatibility of goals within the scheme. Regression (2) is concerned with 'making it easier to introduce change', and if by 'change' management means an increase in managerial prerogative, and hence the ability to introduce short term cost-cutting measures, then it would not be surprising if prior consultation with full-time officials made this less likely.

As well as the frequency of meetings and prior consultation, the intensity of the consultative process might also be influenced by which group initiated the establishment of the scheme. Only 10 per cent of schemes were initiated by 'a union request or employee suggestion' (INIT\_UNION), but in the case of 'improving management-employee relations' (regression 3) their initiative is seen to have a dramatic, positive effect. It could be expected that a desire by workers to establish a scheme would coincide with their interest in improving workplace relations but not necessarily with the goals of the other regressions. That might explain why INIT\_UNION is only significant in regression (3).

Two-thirds of all schemes were initiated by management (INIT\_MAN), with 72 per cent of these coming from workplace management. Surprisingly, this was not seen to be a significant factor in any of the regressions with management-oriented goals (regressions (1), (2) and (4)), but again it was a factor in the case of 'improved management-employee relation'. In addition, the initiation of schemes by government policy (INIT\_GOVT) did not appear to have an effect on their success one way or the other, which is an important result in the sense that schemes do not seem to be compromised by the fact that the government, rather than the workplace negotiators themselves, may have put them on the agenda.

Finally, there is the question of the composition of the scheme. In the survey, ERMs were asked to nominate whether managerial or non-managerial employees had greater representation on the scheme's committee(s), or whether the representation was equal (COMP). Despite 63 per cent of workplaces having a greater proportion of non-managerial employees on their committee, this was not a significant factor in the scheme's success for any of the regressions.

At the same time, in 36 per cent of workplaces, it was necessary for some of the representatives to be members of a union (UNREPS). Interestingly, the coefficient in all four regressions was negative, but was only significant in regression (4). Some commentators might suggest that this vindicates the approach of those firms which do not negotiate with unions and instead deal directly with employees. However, this would be a simplistic conclusion to draw from such a slender thread of evidence, especially since an alternative interpretation may account for it.

Such an interpretation would begin from the relative inexperience of Australian trade unions with a decentralised system, especially one placing emphasis on joint consultation as well as wage bargaining. Although the official policies of unions are

embracing, and in some cases setting the pace for, enterprise bargaining, their internal structure and methods of operation are still geared to the centralised system. In this country, workplace union representatives do not have a history of significant autonomy relative to their full-time officials, and they have therefore had little opportunity to take responsibility for decisions. However, with the growth of enterprise bargaining, we may expect the focus of power within unions to shift towards workplace representatives and their associated bargaining 'infrastructure' (Green 1991).

At present, as the AWIRS results confirm, workplace union representatives are still, on the whole, poorly resourced and inadequately trained to represent their members effectively without constant reference to their full-time officials. Rather than opting for a strategy of 'union avoidance' and dealing directly with employees, which could be counter-productive, management might improve the functioning of its consultative scheme, and hence workplace productivity, by providing union representatives with additional resources and by encouraging them to undertake training programs which upgrade their consultation skills and ability to comprehend the full range of activities of the enterprise.

## CONCLUSION

By contrast with the traditional approach, which views productivity as a mechanistic ratio of output per unit of input, the approach of this paper has been to analyse the process by which inputs are actually transformed into output, focusing specifically upon the interaction between management, unions and employees at the workplace. The main sources of this 'alternative' approach were located in the British industrial relations literature, which has theorised the 'open-ended' nature of the employment relationship, and in recent US literature, which has demonstrated the role of the 'intensity' of joint collaboration in 'best practice' workplace productivity and performance.

The paper then attempted to apply this approach, specifying a model for regression analysis, in the context of a weighted sample of workplaces from the AWIRS data base which had introduced joint consultative arrangements, such as a JCC or QC/PIG. The aim was to 'go behind' the mere presence of these arrangements and identify the characteristics of interaction which contributed to productivity outcomes. These were in turn evaluated not simply by a single narrow productivity measure but rather by a set of performance indicators, which, in addition to productivity and efficiency, also encompassed the ability to introduce change, management-employee relations and output quality.

The regressions produced results which may be grouped into three main categories. First, it was evident that the objectives of successful consultative schemes tended to

be consistent and, in most cases, mutually reinforcing. In particular, schemes which 'improved productivity and efficiency' also led to improvements in 'product or service quality'. However, it was found that such schemes would not necessarily be successful in 'making it easier to implement change' if, say, change was interpreted by management to mean short term cost reduction as against longer term dynamic efficiency gains.

Secondly, the success of consultative schemes was dependent not only upon consistency between their objectives but also within their internal structure and operation. Any evidence of inconsistency on this score tended to compromise the impact of the scheme on the performance indicators. For example, where a JCC or QC/PIG had authority to deal with issues of 'pay and conditions', the relevant indicator was not improved compared with schemes which handled these issues separately. This result highlights the need for managers to come to grips in a more sophisticated way with the dimensions of conflict and cooperation which exist simultaneously within the employment relationship, since the area of potential conflict may be narrowed by well structured joint collaboration, but not necessarily superseded by it.

Thirdly, and most importantly from the viewpoint of our argument in this paper, the role and impact of consultative schemes in improving workplace performance was found to be directly related to the 'intensity' of collaboration between management and workforce. We measured intensity for this purpose by such characteristics as composition of the consultative committee, the frequency of meetings of the committee, who initiated the consultative scheme in the first place and whether prior consultation took place at this stage with employees and unions.

Here, the strongest result generated by the model was that in cases where management properly consulted 'the employees most affected' about the establishment and operation of a JCC or QC/PIG, it was much more likely to lead to 'improved productivity or efficiency'. The role of unions in such schemes, however, was more ambiguous. Our interpretation of the results is that substantial resources and training will be required to overcome an apparent lack of bargaining experience on the part of union representatives involved in workplace consultative arrangements.

## APPENDIX A: TABLES

Table 1: Definitions of Dependent and Explanatory Variables

<i>Dependent Variables:</i>			<i>Operational Criteria</i>
Productivity or Efficiency			Each of the four dependent variables is coded 1 if the scheme was perceived to have lead to an improvement in the performance area listed at left; if not, then it is coded 0.
Introducing Change			
Management-Employee Relations			
Product or Service Quality			
<i>Explanatory Variables:</i>			
<i>Name</i>	<i>Survey Variable</i>	<i>Description</i>	<i>Operational Criteria</i>
LENGTH	H12	Length of time scheme has been operating	Equals 0.5 if 'less than one year'; 1.5 if '1 to less than 2 years'; 3.5 if '2 to less than 5 years'; 7.5 if '5 to less than 10 years'; 12 if '10 years or more'.
REP_NMAN	H13	Non-Managerial employees represented	Equals 0 if none; 0.05 if 1-10'; 0.18 if 11-25'; 0.38 if 26-50'; 0.63 if 51-75'; 0.87 if 76-99'; 1.0 if all covered.
REP_MAN	H14	Managerial employees represented	Equals 0 if none; 0.05 if 1-10'; 0.18 if 11-25'; 0.38 if 26-50'; 0.63 if 51-75'; 0.87 if 76-99'; 1.0 if all covered.
INIT_GOVT	H15a	From where scheme was initiated	Equals 1 if 'government policy'; 0 otherwise.
INIT_MAN	H15b		Equals 1 if initiated by workplace management or higher level management beyond workplace; 0 otherwise.
INIT_UNION	H15c		Equals 1 if in response to union request or employee suggestion; 0 otherwise.
OBJ_EFFCNCY	H16a	Most important objectives of scheme for management	Equals 1 if 'to increase workplace efficiency'; 0 otherwise.
OBJ_PRODV	H16b		Equals 1 if 'to increase productivity'; 0 otherwise.
OBJ_COMM	H16c		Equals 1 if 'to increase communications'; 0 otherwise.
OBJ_IMPCHNG	H16d		Equals 1 if 'to assist in implementing change'; 0 otherwise.
OBJ_NEWTECH	H16e		Equals 1 if 'to help with the introduction of new technology'; 0 otherwise.
OBJ_TURNOVER	H16f		Equals 1 if 'to reduce labour turnover and absenteeism (to increase worker commitment)'; 0 otherwise.
OBJ_JOBSATIS	H16g		Equals 1 if 'to increase job satisfaction'; 0 otherwise.
OBJ-DISPUTE	H16h		Equals 1 if 'to reduce the level of disputation'; 0 otherwise.
OBJ_QUALITY	H16i		Equals 1 if 'to improve quality of the service/product'; 0 otherwise.

**Table 1 (cont): Definitions of Dependent and Explanatory Variables***Explanatory Variables (cont):*

<i>Name</i>	<i>Survey Variable</i>	<i>Description</i>	<i>Operational Criteria</i>
CONS_EMPL	H17a	Groups consulted prior to introduction of scheme	Equals 1 if 'employees most affected'; 0 otherwise.
CONS_WPUN	H17b		Equals 1 if 'workplace union representative'; 0 otherwise.
CONS_UNOFF	H17c		Equals 1 if 'union officials'; 0 otherwise.
CONS_FLSUP	H17d		Equals 1 if 'first-line supervisors/line management'; 0 otherwise.
OPPOSITION	H18	Opposition to the scheme	Equals 1 if 'yes'; 0 if 'no'.
OPP_MAN	H19a	Where did the opposition come from	Equals 1 if 'senior management at this workplace' or 'first-line supervisors/line management'; 0 otherwise.
OPP_EMPL	H19b		Equals 1 if 'employees at this workplace' or 'workplace union representatives'; 0 otherwise.
OPP_UNOFF	H19c		Equals 1 if 'full time union officials'; 0 otherwise.
COMP	H20	Composition of the scheme	Equals 1 if 'more non-managerial than managerial representatives'; 0 otherwise.
UNREPS	H21	Some representatives are union members	Equals 1 if 'yes'; 0 if 'no'.
MEETINGS	H22	Meetings	Equals the number of times there were meetings of the scheme over the past 12 months.
PAY&COND	H24a	Matters over which the scheme has authority to deal	Equals 1 if yes to 'pay and conditions'; 0 if no.
DISCIPLINE	H24b		Equals 1 if yes to 'discipline of employees'; 0 if no.
INDGRIEV	H24c		Equals 1 if yes to 'individual grievances'; 0 if no.
ADVERSE	H26	Adverse effects of scheme	Equals 1 if there have been any adverse effects at the workplace from the operation of this scheme; 0 if not.

Table 2: Descriptive Statistics for Explanatory Variables

Variable	<u>Weighted</u>		<u>Unweighted</u>		Min	Max
	Mean	SD	Mean	SD		
LENGTH	3.943	3.424	4.005	3.783	0.5	12.0
REP_NMAN	0.672	0.316	0.691	0.344	0.0	1.0
REP_MAN	0.615	0.381	0.571	0.431	0.0	1.0
INIT_GOV	0.150	0.321	0.143	0.350	0.0	1.0
INIT_MAN	0.669	0.423	0.663	0.473	0.0	1.0
INIT_UNION	0.098	0.267	0.102	0.304	0.0	1.0
OBJ_EFFCNCY	0.381	0.437	0.375	0.484	0.0	1.0
OBJ_PRODV	0.333	0.424	0.306	0.461	0.0	1.0
OBJ_COMM	0.552	0.447	0.592	0.4912	0.0	1.0
OBJ_IMPCHNG	0.232	0.379	0.283	0.451	0.0	1.0
OBJ_NEWTECH	0.129	0.301	0.155	0.363	0.0	1.0
OBJ_TURNOVER	0.104	0.275	0.118	0.323	0.0	1.0
OBJ_JOBSATIS	0.300	0.412	0.286	0.452	0.0	1.0
OBJ_DISPUTE	0.213	0.368	0.258	0.438	0.0	1.0
OBJ_QUALITY	0.404	0.441	0.346	0.476	0.0	1.0
CONS_EMPL	0.551	0.447	0.527	0.500	0.0	1.0
CONS_WPUN	0.314	0.417	0.424	0.495	0.0	1.0
CONS_UNOFF	0.246	0.387	0.355	0.479	0.0	1.0
CONS_FLSUP	0.532	0.448	0.549	0.498	0.0	1.0
OPPOSITION	0.113	0.285	0.113	0.317	0.0	1.0
OPP_MAN	0.043	0.182	0.039	0.193	0.0	1.0
OPP_EMPL	0.086	0.253	0.080	0.271	0.0	1.0
OPP_UNOFF	0.021	0.128	0.027	0.161	0.0	1.0
COMP	0.634	0.433	0.615	0.487	0.0	1.0
UNREPS	0.357	0.431	0.443	0.497	0.0	1.0
MEETINGS	15.377	14.110	13.845	14.877	0.0	98.0
PAY&COND	0.157	0.327	0.141	0.349	0.0	1.0
DISCIPLINE	0.235	0.381	0.194	0.396	0.0	1.0
INDGRIEV	0.516	0.449	0.463	0.499	0.0	1.0
ADVERSE	0.114	0.286	0.111	0.315	0.0	1.0

**Table 3: Descriptive Statistics for Dependent Variables**

<i>Variable</i>	<i>Weighted</i>		<i>Unweighted</i>	
	Yes	No	Yes	No
Productivity or Efficiency	344.5	111.9	392	174
Introducing Change	349.0	107.4	426	140
Management-Employee Relations	399.7	56.7	482	84
Product or Service Quality	327.3	129.1	360	206

**Table 4: Logistic Estimates of Perceived Changes in Performance Indicators**

Explanatory Variable	Dependent Variable			
	(1) Productivity or Efficiency	(2) Introducing Change	(3) Management- Employee Relations	(4) Product or Service Quality
Intercept	-0.6119 (0.5922)	0.3972 (0.5841)	0.0125 (0.6514)	-1.2255 (0.6198)
LENGTH	<b>0.0973**</b> (0.0417)	-0.0134 (0.0355)	0.0618 (0.0470)	<b>0.1100***</b> (0.0421)
REP_NMAN	-0.7021 (0.4515)	-0.0365 (0.4215)	0.3464 (0.5280)	0.2713 (0.4645)
REP_MAN	0.2038 (0.3402)	0.0571 (0.3383)	-0.3690 (0.4385)	-0.0732 (0.3460)
INIT_GOVТ	0.1735 (0.5007)	-0.3955 (0.5109)	0.8321 (0.5751)	0.0114 (0.5492)
INIT_MAN	0.1621 (0.4274)	0.2311 (0.4465)	<b>1.1050**</b> (0.4868)	-0.1687 (0.4808)
INIT_UNION	0.2304 (0.5590)	0.6870 (0.6033)	<b>3.1914**</b> (1.2424)	-0.6102 (0.5811)
OBJ_EFFCNCY	0.4398 (0.3255)	0.2667 (0.3091)	0.2498 (0.3798)	<b>0.6391*</b> (0.3337)
OBJ_PROD V	<b>0.8785**</b> (0.3455)	<b>-0.5356*</b> (0.3032)	-0.4224 (0.3854)	<b>1.1167***</b> (0.3504)
OBJ_COMM	0.2890 (0.2810)	<b>1.0101***</b> (0.2784)	<b>0.9414***</b> (0.3634)	0.1523 (0.2857)
OBJ_IMPCHNG	-0.1433 (0.3674)	<b>0.6902*</b> (0.4112)	-0.1900 (0.4614)	<b>-0.7561**</b> (0.3837)
OBJ_NEWTECH	-0.7294 (0.4917)	-0.5188 (0.4625)	0.0975 (0.5907)	-0.6481 (0.5215)
OBJ_TURNOVER	-0.9288 (0.5758)	0.4801 (0.6076)	0.9791 (0.8835)	0.5623 (0.6289)
OBJ_JOBSATIS	0.2366 (0.3535)	-0.0982 (0.3361)	0.0517 (0.4318)	-0.4221 (0.3437)
OBJ_DISPUTE	0.1003 (0.3581)	0.1643 (0.3846)	0.3875 (0.5275)	-0.0376 (0.3537)
OBJ_QUALITY	<b>0.6690**</b> (0.3146)	-0.1693 (0.2856)	-0.3710 (0.3511)	<b>0.8440***</b> (0.3223)
CONS_EMPL	<b>0.7917***</b> (0.2648)	<b>0.4905*</b> (0.2660)	<b>0.7335**</b> (0.3330)	<b>0.5950**</b> (0.2684)
CONS_WPUN	-0.2109 (0.3236)	0.2587 (0.3471)	0.1438 (0.4602)	-0.5134 (0.3297)
CONS_UNOFF	-0.3371 (0.3400)	<b>-0.7354**</b> (0.3579)	-0.5089 (0.4702)	0.0836 (0.3512)
CONS_FLSUP	0.2142 (0.2697)	-0.2771 (0.2688)	0.0865 (0.3409)	<b>0.7721***</b> (0.2795)

**Table 4 (cont): Logistic Estimates of Perceived Changes in Performance Indicators**

Explanatory Variable	Dependent Variable			
	(1) Productivity or Efficiency	(2) Introducing Change	(3) Management- Employee Relations	(4) Product or Service Quality
OPPOSITION	-0.5044 (1.0481)	-0.8559 (1.3444)	-0.7001 (1.3962)	<b>-2.7666**</b> (1.2136)
OPP_MAN	-0.9232 (0.8245)	0.0771 (1.1807)	-0.0593 (1.0869)	0.2825 (0.9537)
OPP_EMPL	1.3397 (0.9559)	1.9269 (1.2617)	0.7856 (1.3043)	<b>4.0065***</b> (1.1483)
OPP_UNOFF	-1.2646 (1.0158)	1.3755 (1.5527)	1.1716 (1.5611)	0.6517 (1.2193)
COMP	0.3986 (0.2839)	-0.1612 (0.2822)	-0.1389 (0.3535)	0.00218 (0.2924)
UNREPS	-0.1266 (0.3019)	-0.2091 (0.3078)	-0.2902 (0.3873)	<b>-0.7004**</b> (0.3060)
MEETINGS	<b>0.0255**</b> (0.0117)	<b>0.0161*</b> (0.00941)	-0.00031 (0.0106)	<b>0.0617***</b> (0.0143)
PAY&COND	<b>-0.6477*</b> (0.3624)	<b>-0.8566**</b> (0.3724)	0.5394 (0.5517)	-0.4510 (0.3857)
DISCIPLINE	0.1205 (0.3699)	0.3871 (0.3650)	0.1570 (0.4612)	0.0408 (0.3919)
INDGRIEV	0.3287 (0.2736)	0.4511 (0.2790)	0.2237 (0.3490)	<b>0.5173*</b> (0.2800)
ADVERSE	0.3983 (0.4528)	-0.2606 (0.4117)	0.1353 (0.5278)	0.00939 (0.4435)
-2 Log-likelihood	419.859	430.517	296.441	401.373
$\chi^2$ (df=30)	<b>88.458***</b>	<b>67.521***</b>	<b>46.052**</b>	<b>142.333***</b>
Prop <sup>n</sup> of Observations Correctly Predicted	0.700	0.726	0.843	0.693
Observations	566	566	566	566
Sum of the Weights	456.393	456.393	456.393	456.393

Notes: Regressions were performed using the LOGISTIC procedure from the SAS Statistical computer package. Standard errors appear in parentheses. Those variables which are significant are highlighted in bold type, with \*\*\* indicating significance at the 1 per cent level, \*\* at the 5 per cent level and \* at the 10 per cent level respectively.

In the summary statistics, the  $\chi^2$  statistic tests the null hypothesis that all the coefficients are simultaneously zero. As well, each observation was assigned a predicted value of one if the probability of the fitted value is 0.5 or greater; otherwise the predicted value is zero.

**Table 5: Estimated Impact of Significant Dummy and Continuous Variables on the Probability that the Consultative Scheme lead to an Improvement in the Performance Indicator**

		Dependent Variable							
		(1) Productivity or Efficiency		(2) Introducing Change		(3) Management- Employee Relations		(4) Product or Service Quality	
		X=0	X=1	X=0	X=1	X=0	X=1	X=0	X=1
INIT_MAN						0.836	0.939		
INIT_UNION						0.886	0.995		
OBJ_EFFCNCY								0.768	0.863
OBJ_PRODV		0.765	0.887	<b>0.834</b>	<b>0.746</b>			0.745	0.899
OBJ_COMM				0.706	0.868	0.864	0.995		
OBJ_IMPCHNG				0.781	0.877			<b>0.835</b>	<b>0.703</b>
OBJ_QUALITY		0.769	0.880					0.751	0.875
CONS_EMPL		0.739	0.862	0.762	0.839	0.877	0.937	0.753	0.847
CONS_UNOFF				<b>0.834</b>	<b>0.707</b>				
CONS_FLSUP								0.737	0.859
OPPOSITION								<b>0.853</b>	<b>0.267</b>
OPP_EMPL								0.750	0.994
UNREPS								<b>0.845</b>	<b>0.730</b>
PAY&COND		<b>0.829</b>	<b>0.717</b>	<b>0.828</b>	<b>0.671</b>				
INDGRIEV								0.764	0.845
LENGTH	X=0		0.749						0.733
	X=6		0.842						0.842
	X=12		0.905						0.911
MEETINGS	X=0		0.747		0.766				0.621
	X=12		0.800		0.799				0.775
	X=48		0.910		0.876				0.969
Means			0.814		0.807		0.914		0.809

Notes: Presented are the estimated probabilities of a workplace indicating that the JCC or QC/PIG scheme led to an improvement in the area indicated by the dependent variable. The logit from the regressions of Table 4 were evaluated at the value of the variable shown and the (weighted) mean value of all other variables. The logit was then converted into a probability using the formula

$$Prob = \frac{e^{\text{logit}(\beta)}}{(1 + e^{\text{logit}(\beta)})}$$

Those variables which reduce the probability, that is, for which the regression coefficient is negative, are highlighted in bold type.

## APPENDIX B: EMPLOYEE RELATIONS MANAGEMENT QUESTIONNAIRE

SECTION H: MANAGEMENT AND EMPLOYEE COMMUNICATION	
<p>I would now like to ask questions about management and employee communications at this workplace.</p> <p>→ SHOWCARD 35 <span style="float: right; border: 1px solid black; border-radius: 50%; padding: 2px;">6-1</span></p> <p>H.1 Looking at Card 35 (PAUSE), which of these methods, if any, are currently used by management here to communicate with employees at this workplace?</p> <p>Workplace newsletter/staff bulletin ... 7-01</p> <p>Regular meetings between senior management and employees ... 9-02</p> <p>Task forces, ad hoc joint committees or working parties ... 11-03</p> <p>Regular meetings between employees and supervisors or line management ... 13-04</p> <p>Daily 'walk around' the workplace by senior management ... 15-05</p> <p>Ongoing formal joint consultative committees ... 17-06</p> <p>Quality circles/productivity improvement groups ... 19-07</p> <p>Suggestion scheme for employees ... 21-08</p> <p>Employee representatives on board of management/directors ... 23-09</p> <p>Regular social functions ... 25-10</p> <p>NONE OF THE ABOVE ... 27-00 → H.3</p>	<p>→ SHOWCARD 35</p> <p>H.3 Looking again at Card 35 (PAUSE), which of these methods, if any, operated here in the past but have been discontinued?</p> <p>Workplace newsletter/staff bulletin ... 51-01</p> <p>Regular meetings between senior management and employees ... 53-02</p> <p>Task forces, ad hoc joint committees or working parties ... 55-03</p> <p>Regular meetings between employees and supervisors or line management ... 57-04</p> <p>Daily 'walk around' the workplace by senior management ... 59-05</p> <p>Ongoing formal joint consultative committees ... 61-06</p> <p>Quality circles/productivity improvement groups ... 63-07</p> <p>Suggestion scheme for employees ... 65-08</p> <p>Employee representatives on board of management/directors ... 67-09</p> <p>Regular social functions ... 69-10</p> <p>NONE OF THE ABOVE ... 71-00</p>
<p>→ SHOWCARD 35</p> <p>H.2 Looking again at Card 35 (PAUSE), which of these methods, if any, were introduced in the past five years?</p> <p>Workplace newsletter/staff bulletin ... 29-01</p> <p>Regular meetings between senior management and employees ... 31-02</p> <p>Task forces, ad hoc joint committees or working parties ... 33-03</p> <p>Regular meetings between employees and supervisors or line management ... 35-04</p> <p>Daily 'walk around' the workplace by senior management ... 37-05</p> <p>Ongoing formal joint consultative committees ... 39-06</p> <p>Quality circles/productivity improvement groups ... 41-07</p> <p>Suggestion scheme for employees ... 43-08</p> <p>Employee representatives on board of management/directors ... 45-09</p> <p>Regular social functions ... 47-10</p> <p>NONE OF THE ABOVE ... 49-00</p>	<p>→ SHOWCARD 36</p> <p>H.4 Looking at Card 36 (PAUSE), on which, if any of these issues affecting this workplace does management regularly provide information to employees or their representatives?</p> <p>Future staffing plans ... 73- 1</p> <p>Marketing strategies ... 74- 2</p> <p>Investment plans ... 75- 3</p> <p>Corporate plans ... 76- 4</p> <p>The financial position of this workplace ... 77- 5</p> <p>NONE OF THE ABOVE ... 78- 0</p>

(continued) →

6 - K

→ SHOWCARD 42

H.19 Looking at Card 42 (PAUSE), where did the opposition come from?

- Higher level management beyond this workplace ... 56- 1
- Senior management at this workplace ... 57- 2
- First line supervisors/line management ... 58- 3
- Employees at this workplace ... 59- 4
- Workplace union representatives ... 60- 5
- Full time union officials ... 61- 6
- NONE OF THE ABOVE ... 62- 0

H.24 Does the [name of scheme] have the authority to deal with ...

READ OUT IN TURN AND CODE RESPONSE TO EACH

	Yes	No
Pay and conditions? ...	7- 1	2
Discipline of employees? ...	8- 1	2
Individual grievances? ...	9- 1	2

H.25 Have there been any improvements in the following areas as a result of the [name of scheme]?

READ OUT IN TURN AND CODE RESPONSE TO EACH

	Yes	No
Productivity or efficiency? ...	10- 1	2
Making it easier or quicker to introduce change? ...	11- 1	2
Management-employee relations? ...	12- 1	2
Labour turnover? ...	13- 1	2
Product or service quality? ...	14- 1	2

H.26 Have there been adverse affects at this workplace resulting from the operation of the [name of scheme]?

Yes ...	15- 1
No ...	2 → NEXT SECTION

→ SHOWCARD 43

H.20 Looking at Card 43 (PAUSE), which one of these statements best describes the composition of the [name of scheme]?

- There are more non-managerial representatives than managerial representatives... 63- 1
- There is an equal number of non-managerial and managerial representatives ... 2
- There are more managerial representatives than non-managerial representatives... 3

H.27 What are these?

- Waste of time ... 16-1
- Did not achieve objectives ... 17-2
- Slowed process of change ... 18-3
- Disrupts workplace ... 19-4
- Negative reaction from first line supervisors ... 20-5
- Other (SPECIFY) .....21-8

U

H.21 Is it required that at least some employee representatives must be union members?

- Yes ... 64- 1
- No ... 2

H.22 Over the last year roughly how many times have there been meetings of the [name of scheme]?

Number ...     
65 66

H.23 What matter did the [name of scheme] most often deal with in the last year?

PRINT EXACT ANSWER GIVEN  
.....  
.....  
.....67-

H.28 CHECK GUIDE CARD:

Is this workplace the head office?  
Yes ... 22- 1 → NEXT SECTION  
No ... 2 → H.29

M SHOWCARD 44

H.29 Looking at Card 44 (PAUSE), which, if any, of these currently operate at a higher level in this organisation beyond this workplace and makes recommendations that have an effect here?

On-going formal joint consultive committees (formal committees of management and employee/union representatives that discuss workplace issues) . . . . . 23-1

Employee representatives on board or management/directors (non-managerial employee/ union representatives on the company's board of directors) . . . . .24-2

Ad hoc committees or working parties or task forces (set up to discuss specific issues or problems these groups tend to be disbanded after they have reported) . . . . .25-3

Occupational health and safety committees . . . . .26-4

NONE OF THE ABOVE . . . . . 27-0

BLANK 28-38

THERE IS NO SECTION I

## REFERENCES

- Addison, J.T. and Barnett, A.H. (1982), "The Impact of Unions on Productivity", *British Journal of Industrial Relations*, Vol 20, No 2, pp. 145-62.
- Addison, J.T. and Hirsch, B.T. (1989), "Union Effects on Productivity, Profits and Growth: Has the Long Run Arrived?", *Journal of Labour Economics*, Vol 7, No 1, pp. 72-105.
- Alexander, M.J. and Green, R. (1992), "Workplace Productivity: Theory and Evidence", in *Industrial Relations and Workplace Productivity*, Industrial Relations Research Series, Number 2, August, Commonwealth Department of Industrial Relations, Canberra.
- Brown, C. and Medoff, J. (1978), "Trade Unions in the Production Process", *Journal of Political Economy*, Vol 86, No 3, pp. 355-78.
- Brown, W. and Nolan, P. (1988), "Wages and Labour Productivity: The Contribution of Industrial Relations Research to the Understanding of Pay Determination", *British Journal of Industrial Relations*, Vol 26, No 3, pp. 339-61.
- Cooke, W.N. (1989), "Improving Productivity and Quality Through Collaboration", *Industrial Relations*, Vol 28, No 2, pp. 299-319.
- Cooke, W.N. (1990), "Factors Influencing the Effect of Joint Union-Management Programs on Employee-Supervisor Relations", *Industrial and Labour Relations Review*, Vol 43, No 5, pp. 587-603.
- Cutcher-Gershenfeld, J. (1991), "The Impact on Economic Performance of a Transformation in Workplace Relations", *Industrial and Labour Relations Review*, Vol 44, No 2, pp. 241-60.
- Daly, A., Hitchens, D.M.W.N. and Wagner, K. (1985), "Productivity, Machinery and Skills in a Sample of British and German Manufacturing Plants", *National Institute Economic Review*, February, pp. 48-61.
- Flanders, A. (1964), *The Fawley Productivity Agreements*, London: Faber.
- Freeman, R.B. and Medoff, J.L. (1979), "The Two Faces of Unionism", *The Public Interest*, Fall, No 57, pp. 69-93.
- Freeman, R.B. and Medoff, J.L. (1984), *What Do Unions Do?*, Basic Books.

- Green, R. (1990), "The Impact of Product and Labour Markets on Workplace Industrial Relations", AWIRS Paper No 2, Commonwealth Department of Industrial Relations, Canberra.
- Green, R. (1991), "Change and Involvement at the Workplace: Evidence from the Australian Workplace Industrial Relations Survey", *Economic & Labour Relations Review*, Vol 2, No 1, June
- Green, R. (1992), "Analysis and Measurement of Workplace Productivity", ESC Working Paper No 7, May, University of Newcastle, NSW
- Green, R. and Macdonald, D. (1991), "The Australian Flexibility Paradox", *Journal of Industrial Relations*, Vol 33, No 4, December
- Hirsch, B.T. and Addison, J.T. (1986), *The Economic Analysis of Unions: New Approaches and Evidence*, Allen & Unwin.
- Katz, H. (1985), *Shifting Gears: Changing Labor Relations in the US Automobile Industry*, Cambridge MA: MIT Press
- Kochan, T.A., Katz, H.C. and McKersie, R.B. (1986), *The Transformation of American Industrial Relations*, New York: Basic Books.
- Kochan, T.A., McKersie, R.B. and Capelli, P. (1983), "Strategic Choice and Industrial Relations Theory", *Industrial Relations*, Vol 23, No 1, pp. 16-39.
- Marchington, M. (1987), "A Review and Critique of Research on Developments in Joint Consultation", *British Journal of Industrial Relations*, Vol 25, No 3, pp. 339-351.
- Marchington, M. (1992), "The Practice of Joint Consultation in Australia - A Preliminary Analysis of the AWIRS Data", ACIRRT Working Paper No 21, March.
- McKersie, R.B. and Hunter, L.C. (1973), *Pay, Productivity and Collective Bargaining*, London: MacMillan Press.
- Metcalf, D. (1989a), "Water Notes Dry Up: The Impact of the Donovan Reform Proposals and Thatcherism at Work on Labour Productivity in British Manufacturing Industry", *British Journal of Industrial Relations*, Vol 27, No 1, pp. 1-31.
- Metcalf, D. (1989b), "Trade Unions and Economic Performance: The British Evidence", *LSE Quarterly*, Spring, pp. 21-46.

- Metcalf, D. (1990), "Union Presence and Labour Productivity in British Manufacturing Industry: A Reply to Nolan and Marginson", *British Journal of Industrial Relations*, Vol 28, No 2, pp. 249-266.
- Nichols, T. (1986), *The British Worker Question: A new Look at Workers and Productivity in Manufacturing*, London: Routledge & Kegan Paul.
- Nolan, P. (1989), "Walking on Water? Performance and Industrial Relations Under Thatcher", *Industrial Relations Journal*, Vol 20, No 2, pp. 81-92.
- Nolan, P. and Marginson, P. (1990), "Skating on Thin Ice? David Metcalf on Trade Unions and Productivity", *British Journal of Industrial Relations*, Vol 28, No 2, pp. 227-247.
- Oswald, A.J. (1985), "The Economic Theory of Trade Unions: An Introductory Survey", *Scandinavian Journal of Economics*, Vol 87.
- Turnbull, P.J. (1988), "The Economic Theory of Trade Union Behaviour: A Critique", *British Journal of Industrial Relations*, Vol 26, No 1, pp. 99-118.
- Turnbull, P.J. (1989), "Trade Unions and Productivity: Opening the Harvard 'Black Boxes'", *Warwick Papers in Industrial Relations*, No 24, January.

# Understanding Industrial Action in Australian Workplaces\*

Peter Dawkins and Mark Wooden

## INTRODUCTION

Only one Australian study (Drago and Wooden 1990) has been published which has used cross-sectional data to examine the factors associated with strike occurrence.<sup>1</sup> The data that underlie that study, however, were not collected from a representative sample of Australian firms. In particular, the sample was constrained to workplaces operated by member companies of the Business Council of Australia which tend to be relatively large and concentrated in manufacturing.

This paper builds on this earlier work, but using the more representative data obtained in the Australian Workplace Industrial Relations Survey (AWIRS). Furthermore, the present study examines the factors which explain not only strike incidence, but other types of industrial actions such as stop-work meetings, work bans and the like.

In what follows we first provide a brief discussion of the rationale underlying our approach to the study of strike activity, before outlining a taxonomy of factors which previous research has suggested may be of importance. The variables constructed from the AWIRS to proxy these influences are described in 'Data and Variables' and are then included in probit models to explain the incidence of strikes, stop-working meetings and other types of industrial action, respectively. A detailed discussion of the findings is presented in 'Results'. A summary of these results completes the paper.

\* This paper forms part of a program of research on industrial action being undertaken through the Western Australian Labour Market Research Centre which began with a paper by the authors in collaboration with Shane Bushe-Jones on the relationship between grievance procedures and strike incidence (Dawkins et al 1992). We are grateful to Shane Bushe-Jones for his contribution to the earlier paper, and to the Chamber of Commerce and Industry of Western Australia which funded that research. We also thank the Department of Industrial Relations for the data.

<sup>1</sup> Those same data are also used to explain strike activity using a slightly different methodological approach in Drago, Wooden and Sloan (1992).

## MODELLING THE DETERMINANTS OF STRIKE ACTIVITY

### Theory versus Empirics

Unlike Australia, in the US and the UK cross-sectional studies of strike activity abound, though even here workplace-level studies are a relatively new development. A key feature of the majority of these studies is the absence of any coherent, integrated model of strike activity from which testable hypotheses can be generated. Instead, eclectic, ad hoc models are dominant. This approach has been criticised. Kennan (1986), for example, implies that this approach is highly amenable to specification search wherein 'regression results are obtained which provide suspiciously impressive support' (p. 1122) for the author's hypotheses.

Nevertheless, where theoretical models have been developed, the empirical evidence indicates relatively poor explanatory power. Within economics, for example, the relatively recent appearance of strike models based on asymmetric information was and is widely perceived 'as something of a breakthrough' (Ingram, Metcalf and Wadsworth 1991). Prior to this development, economics could only explain strikes as resulting from mistakes or irrational behaviour, assumptions with which most economists were extremely uncomfortable. Once it is assumed, however, that one side of the bargaining equation possesses more and better information than the other, rational behaviour can give rise to strikes. For example, if it is assumed that firms know their own profits but that workers and unions are only aware of the parameters that affect those profits, workers will resort to industrial action in order to identify firms capable of making more concessions. The strike, therefore, is a screening device.

Moreover, such theories generate testable hypotheses about the relationship between strikes and other variables such as uncertainty, profitability and human capital. Nevertheless, none of the attempts to test this model to date (Booth and Cressy [1990] in the UK, and Tracy [1987] and Card [1990] in North America) have found evidence which is entirely consistent with the theory and in all cases, alternative explanations for the findings can be offered. Indeed, as Gramm (1986, p. 363) has observed, 'the task of formulating a theory of strikes that ... generates unambiguous hypotheses is a formidable one'. A more profitable firm, for example, is more able to accommodate worker demands and hence should be characterised by fewer strikes. Alternatively, the incentive for workers to strike is greater in more profitable firms since both the potential reward and the expectation of the strike being successful are greater.

It is our view, therefore, that ad hoc analyses continue to offer the greatest potential for identifying why strikes arise and that the counter to Kennan's (1986) implicit claim that such approaches lead to spurious, data-driven results, lies in replication. If different researchers using different data sets can continue to find the same sorts of variables having similar effects, the charge that the findings are in some sense 'spurious' is difficult to sustain.

### A Taxonomy of the Factors Influencing Industrial Action

Our analysis of the factors influencing industrial action in Australia begins with first identifying potential variables of importance. In this task we rely heavily on

previous empirical work utilising micro-level data (rather than time-series or industry-level data). In total some 16 such studies were identified: six using US data (Farber 1978, Mauro 1982, Gramm 1986, Tracy 1986, 1987, Abowd and Tracy 1989); four from Canada (Swidinsky and Vanderkamp 1982, Cousineau and Lacroix 1986, Gunderson, Kervin and Reid 1986, Card 1990); five from the UK (Edwards 1981, Blanchflower and Cubbin 1986, Booth and Cressy 1990, Ingram et al 1991, Machin et al 1992); and one from Australia (Drago and Wooden 1990). This, however, does not preclude consideration of factors not covered in these studies. Indeed, one of the strengths of the AWIRS is the breadth of potential explanatory variables that can be measured.

The explanatory variables are classified into a number of groups which we believe reflects the process by which industrial disputes arise. First, are the characteristics of the parties to the employment relationship; that is, on one side, unions and the workforce, and on the other, firms. Strike action will also be dependent on the bargaining issues or perhaps more accurately, the history of bargaining between the parties. Thus, for example, where negotiations in the past have netted employees relatively favourable outcomes, we might expect the likelihood of strike action in the near future to be relatively low. The nature of the relationship between the agents to the bargain is also likely to be of importance. Where good communication lines between workers and management exist, higher levels of cooperation may be forthcoming which will militate against strike action. Finally, the environment in which the bargaining takes place will be of importance and we include here economic influences, such as the state of the economy and the wider state of industrial relations.

We now turn to the variables included in each of these groups, providing first a prediction of the direction in which that variable will be associated with industrial conflict (given in parentheses) and a brief discussion of the reasons for that expectation.

### *Workplace and Firm Characteristics*

*Workplace size (+)*. Of the 16 studies considered, ten included a measure of workplace (or bargaining unit) size and all find a significant positive relationship. Drago and Wooden (1990) provide three reasons why workplace size is expected to be positively associated with strikes. First, in larger plants communication channels are likely to be less effective and hence grievances are more likely to go unnoticed. Second, large workplaces are associated with more alienating and impersonal work environments. Third, and relatedly, employees are provided with fewer opportunities to influence decision-making processes in larger workplaces.

*Firm size (?)*. Controlling for firm size in addition to workplace size is potentially important for at least four reasons. First, large firms (as distinct from large workplaces) are likely to be of greater strategic value to unions and hence targeted for industrial action as part of wider industrial campaigns. Second, as Gunderson et al (1986) observe, it is far more difficult for unions to ascertain the state of product markets faced by large diversified conglomerate firms, and hence the use of strikes as a 'truth eliciting' device will be more necessary. Third, and giving rise to the opposite prediction, the very diversification of large firms may make it more difficult to organise coordinated industrial action (Drago and Wooden 1990). Finally, strike

incidence may well depend on the amount of resources managers devote to establishing procedures for communicating with employees and for hearing and resolving grievances, and this is likely to be more closely correlated with firm size than with workplace size.

We, therefore, believe it is important to control for firm size independently of workplace size, though a priori, no sign prediction can be attached to the firm size variable.<sup>2</sup>

*Capital-labour ratio (?/-)*. The ratio of capital to labour might be expected to be associated inversely with strike activity since the cost of lost work time in the form of idle machinery is likely to be far lower in labour intensive workplaces. However, in stark contrast to this line of reasoning, Farber (1978, p. 267) argues that where the ability of labour to cause a cessation of production in the short-run is greatest, unions will be more likely to begin strike action and less ready to concede to employer pressure. Furthermore, it may be easier for highly automated workplaces to maintain operations during a strike (Gramm 1986, Tracy 1986). No unambiguous prediction about the relationship between the capital-labour ratio and strike incidence can therefore be made. Nevertheless, previous research suggests that an inverse relationship would seem most likely, with Farber (1978), Gramm (1986), Tracy (1986) and Ingram et al (1991) all reporting a positive relationship between strikes and the ratio of labour in total costs (which is invariably used to proxy for the inverse of the capital-labour ratio).

*Shift work (?)*. Shift work may also influence strikes, though a priori the direction of the effect is again unclear. Drago and Wooden (1990, p. 40) argue that shift work may be an undesirable working condition and hence lead to grievances and ultimately strikes. Alternatively, it represents one source of fragmentation of worker unity, thus reducing the likelihood of strikes; a factor which the results of Blanchflower and Cubbin (1986) suggests is of greater consequence for long duration strikes than for short strikes.

*Foreign ownership (+)*. It is hypothesised that foreign ownership is likely to be associated with greater levels of strike activity. This might be expected as a result of the adoption of international management practices which conflict with accepted industrial relations norms in Australia. Furthermore, foreign ownership, like workplace size, may be associated with greater uncertainty about the size of rents available for distribution (Booth and Cressy 1990). Nevertheless, none of the UK studies which have considered foreign ownership have uncovered a significant relationship.

*Public ownership (-)*. Public ownership is typically associated with monopoly rents which should mean less conflict over the distribution of those rents (Booth and Cressy 1990) and hence less disputation.

*Workplace/firm age (-)*. One factor which has previously not been remarked upon is the length of time over which a firm or workplace has been in operation, but older firms and workplaces, by virtue of their very survival, may be expected to have more stable, peaceful industrial relations and hence less strike activity.

<sup>2</sup>

The only study to claim a significant firm size effect is Tracy (1986). He reports a strong negative relationship. The proxy used, however, was total sales rather than employment.

*Technological change (+)*. Following, Shorey (1976), the adoption of technological change is expected to be positively associated with strike incidence given that change is a significant source of disputation in its own right (as a result of its impact on job security and established practices and routines). Further, as Drago and Wooden (1990, p. 35) argue, 'technological change may be used as a vehicle to negotiate improvements in wages or other conditions of work'. Nevertheless, in the results reported by Drago and Wooden (1990), their measure of technological change actually attracts a negative (albeit insignificant) sign.<sup>3</sup>

*Organisational change (+)*. As with technological change, it could equally be argued that organisational change is a source of conflict. Indeed, the AWIRS reveals such change to be much more widespread and in many instances may well be more threatening to employees (eg., where firm ownership changes).

### *Union Characteristics*

*Union power (+)*. Most studies recognise that for successful collective action to occur, union representation is virtually always needed. More importantly, strike action will hinge on the relative bargaining power of unions, and consistently studies have found indicators of union power, such as the level of union membership, positively associated with strike frequency.

*Multi-unionism (+)*. A second dimension to unions is their organisational structure, the main elements of which are the number of unions at any one workplace and whether unions are organised primarily along occupation, industry or enterprise lines (though both are highly inter-related). As Drago and Wooden (1990, p. 38) observe, multiple unionism is likely to promote strike activity via stimulating inter-union rivalry and an increased likelihood of demarcation disputes, a conclusion which also receives support from UK data (Machin et al 1992).

*Enterprise focused union structures (-)*. Drago et al (1992, p. 47) argue that unions organised along occupation lines, since they have membership spread across a multitude of firms in a multitude of industries, are 'less likely to be in touch with members' needs and are likely to be less responsive to those needs'. Such arguments suggest high levels of disputation where such unions are present given both the greater likelihood of negotiating 'errors' and a greater incidence of industrial action in support of negotiations taking place at levels beyond the workplace. Using a variable designed to measure the 'enterprise focus' of different unions, Drago et al (1992) report results which provide strong support for this hypothesis.

### *Workforce Characteristics*

Multivariate studies of strike incidence often find the propensity to strike to vary with worker characteristics. In particular, strikes are found to be more common where workers are prime-age *males* and have *full-time, blue-collar* jobs in what can loosely be described as the 'primary' labour market. As Gramm (1986, p. 369)

<sup>3</sup>

Drago and Wooden (1990) classify technological change as a general economic environment factor. Their measure of technological change, however, concerned the rate of technological innovation within the industry rather than the extent to which individual firms adopt technological change.

points out, while such findings may be the result of systematic differences in attitudes held toward management (especially in the case of occupation), it may also reflect differences in the expected benefits from strike action. Part-time, casual employees, for example, will perceive less gain from successful strike action given their much more marginal attachment to the firm.

*Worker tenure and firm-specific capital (-).* Tenure is likely to be associated with higher levels of commitment to the organisation. As a consequence, long-serving employees are less likely to support strike action. Additionally, economic theories of strikes typically postulate that strike activity will be lower in the presence of rents attaching to the worker due to firm-specific capital. Tenure is frequently used to represent this effect (eg., Tracy 1987).

### *Internal Industrial Relations Environment*

A major cause of much conflict in the workplace lies in the way workplaces are managed. Poor leadership, first-line supervisors who lack people management skills, ineffective communication networks and the absence of genuine information-sharing are all likely to make for an environment which is conducive to industrial conflict. Nevertheless, among the 16 studies reviewed, with the exception of the work of Drago and Wooden (1990), there has been an almost total neglect of such factors. The discussion below, therefore, constitutes what is close to a first attempt in determining the factors of relevance that may be testable within an empirical framework.

*Communication, information sharing and employee involvement (-).* Drawing partly from Krieglner et al (1988), we hypothesise that workplaces with communication networks that facilitate the more rapid flow of information, which share information with workers and which encourage employee involvement in decision-making, will be less dispute prone.

*Cooperation (-).* A highly significant variable in the work of Drago and Wooden (1990) is an indicator of union-management cooperation. This variable, however, is likely to be closely dependent on other variables considered elsewhere, such as communication and employee involvement, and hence is unlikely to be exogenous.<sup>4</sup> Nevertheless, structures implemented specifically to enhance intra-workplace cooperation could be included.<sup>5</sup>

*Management training in employee relations (-).* In a re-worked version of Drago and Wooden's original analysis, Drago et al (1992) report that an indicator of 'managerial quality' is associated with fewer severe strikes (though not fewer stoppages per se). Since this variable is constructed from perceptions about the quality of management training, this finding possibly signifies that where management and, in particular, first-line managers, have the skills and training to

<sup>4</sup> Furthermore, as Drago et al (1992, p. 242) note, what many managers may regard as 'cooperation' may actually amount to little more than non-interference by unions.

<sup>5</sup> Drago and Wooden (1990) include a dummy variable indicating the presence of joint consultative committees. This variable, however, attracts a positive sign which Drago and Wooden admit may signal reverse causality; that is, such committees may be a response to strike prone environments.

effectively deal with worker grievances, such grievances will be less likely to escalate to the dispute stage.

*Profit-sharing* (?). Drago and Wooden (1990) also uncover strong evidence that the presence of profit-sharing arrangements reduces strikes. Their explanation for this finding is that gains-sharing can promote organisational commitment and reduce the divergence between managerial and employee goals' (p. 36) which will be reflected in a lesser incidence of industrial action. Alternatively, Booth and Cressy (1990, p. 281) argue that profit-sharing will be associated with better information about profitability and hence reducing the likelihood of strikes arising from unions over-estimating firm profits.

*Piece rate pay* (+). Piece rate pay systems are typically argued to be associated with higher strike probabilities because they: i) increase employee awareness of the forces operating on workplace output levels; ii) reduce the flexibility of the bargaining relationship; and iii) invariably involve protracted negotiations to implement and maintain (Shorey 1976). Evidence to support this hypothesis has been found by Blanchflower and Cubbin (1986) and Booth and Cressy (1990) for the UK and by Drago and Wooden (1990) for Australia.

*Grievance procedures* (-). Formal grievance and dispute procedures are included in awards with the aim of preventing disputes occurring. As Siebert and Addison (1981, p. 402) argue, detailed written agreements outlining the procedures to be followed in the event of a dispute should reduce strikes by lessening 'the need for negotiations at a time when emotions would otherwise be heightened'. As such, we might expect workplaces where such procedures exist to be less strike prone. Blanchflower and Cubbin (1986), however, find exactly the opposite in their analysis of data from the 1980 UK WIRS and conclude that formal procedures 'represent an institutionalisation of conflict' (p. 37). Somewhat differently, Wooden (1991) uses the data analysed by Drago and Wooden (1990) to show that grievance procedures only have beneficial effects where they are used 'all the time'. It may, therefore, be necessary to isolate those workplaces where no selectivity is shown in the use of such procedures.

*Internal formalisation and rules* (+). Firms may also have in place rules and policies which impinge on the ability of managers to respond flexibly to potential dispute situations. We, therefore, expect that a greater incidence of formal rules and procedures (ie., greater bureaucracy) will be associated with a greater probability of industrial action.

*Award structures*. The bargaining environment may also be affected by the type of awards that apply at the workplace. Drago and Wooden (1990), for instance, find company awards significantly and negatively associated with serious strikes (though not with strike frequency), which they argue reflects the superior ability of company awards to meet the unique workplace-specific needs of both employer and employee. They do, however, note the possibility that company awards may be symptomatic of relatively powerful managers *vis-à-vis* unions.

Additionally, differential impacts on strikes may be exerted by federal awards *vis-à-vis* state awards.

### ***Bargaining Issues***

*Relative pay (-)*. Strike activity should partly depend on the issues over which bargaining occurs and hence which are ultimately responsible for the manifestation of strikes. Unions, for example, frequently strike over pay. As a consequence, strikes should be less frequent in workplaces paying relatively high wages. Unfortunately, this effect is difficult to isolate given that high wages are also an outcome of strike action. It is perhaps unsurprising, therefore, that most overseas studies which have tested for wage effects have included a variable measuring changes in real wages over time (eg., Mauro 1982, Gramm 1986, Gunderson et al 1986).

*Non-wage benefits (-)*. Though little considered in the empirical literature so far, the arguments concerning relative pay apply with equal force to non-wage benefits, whether it be fringe benefits such as superannuation, or pleasant, safe physical working conditions.

### ***Economic and External Environment***

*Profitability (?)*. The relationship between profitability and strike level has been at the centre of a number of the North American studies (eg., Mauro 1982, Gramm 1986, Tracy 1986, Card 1990) and again unambiguous predictions cannot be made. Simple joint-cost models of strikes predict that the higher the bargaining surplus the lower the probability of strikes, since firms will be both more willing and able to concede to union demands. On the other hand, as Gramm (1986) observes, high profit levels increase the potential returns to workers from striking, providing a greater incentive to strike. Further, more profitable operations should be more able to withstand the costs of strikes. Consequently, evidence is again mixed: Mauro (1982) finds a significant negative relationship, Card (1990) reports a positive association, Farber (1978), Gramm (1986) and Tracy (1986) report insignificant relationships, while Drago and Wooden (1990) report the presence of a U-shaped quadratic.

Further evidence in support of asymmetric information strikes theories is produced by Tracy (1986, 1987) who finds the volatility in profits positively related to both the incidence and duration of strikes. Increasing volatility, it is argued, reflects high levels of general economic uncertainty which, in turn, will mean increased union uncertainty about future profits and hence a greater likelihood of bargaining errors.

*Market power (?)*. In the framework proposed by Gramm (1986), a critical influence is the firm's ability to maintain its market share during industrial action. This is clearly greater where firms have monopoly power, since substitutes are not so readily available. Alternatively, strike models based on asymmetric information predict that strike probabilities will be lower in such firms because the distributional battle over the rents is likely to be less intense (eg., Tracy 1987). Not surprisingly, the evidence on the net effect is again mixed. Cousineau and Lacroix (1986), Gramm (1986) and Tracy (1986, 1987) find significant positive relationships with indicators of monopoly power, Tracy and Abowd (1987) find the opposite, while Drago and Wooden (1990) detect a U-shaped quadratic.

*Demand* (?). Employer willingness to sustain strike action may also depend on the current level of economic activity. Where demand is low and consequently both capital and labour are idle, employers will be more prepared to weather a long strike; indeed, they may even encourage such a situation since idle labour will now no longer have to be paid for. Again alternative hypotheses exist which give rise to the opposite prediction. In particular, low levels of product demand are a signal to labour that profits are down, discouraging strike activity.

*Labour market tightness* (?). Alternative lines of reasoning also exist concerning the relationship between the state of the labour market and strike incidence. As Drago and Wooden (1990, p. 34) note,

... when the demand for labour is weak, the costs employees face from striking are higher and so the incidence of strikes should be lower. On the other hand, employers may make fewer concessions when labour markets are slack.

Nevertheless, while cross-section analysis has produced mixed results, the bulk of time-series analysis points to pro-cyclical movements in strike activity (see Kennan 1986 for a review). One reconciliation of the conflicting results observed in the micro-level, cross-section studies is provided by Tracy (1986). He finds strike incidence inversely correlated with the state of the labour market for the industry, but positively correlated with local labour market conditions. It does not seem unreasonable to expect the latter effect to dominate for the economy as a whole, thus hence explaining why more aggregate studies typically find pro-cyclical strike behaviour.

*External industrial relations environment.* Industrial action is not always the result of influences bearing directly on the firm concerned. For example, workers often stop work in support of action taking place elsewhere and while such secondary boycotts are technically illegal, are very much part of the industrial relations heritage in Australia. More importantly, strike action may arise out of negotiations which occur at the industry or national level.

## DATA AND VARIABLES

### Data

Little needs to be said here regarding the AWIRS data set. Suffice to say that the analysis reported below only makes use of the large workplace sample and since a number of the variables are generated from the Employee Profile Questionnaire (EPQ), is constrained to a maximum of 1747 observations  $\text{\pounds}$  the number of EPQ forms returned. Of course, missing observations on variables of interest further reduces the useable number of observations (in the main analysis we employ 1370 observations).

### Dependent Variables

Most empirical studies of strike activity employ measures of either the frequency of industrial action, such as the number of industrial stoppages during a defined period

of time, or severity of such action, such as the amount of working time lost as a result of strikes (or both). Unfortunately, the AWIRS data is relatively poor when it comes to industrial action. Rightly or wrongly, the view was taken that attempting to collect detailed retrospective information on industrial action (such as numbers of stoppages and other actions, workers involved and days lost) lay outside the scope of the AWIRS. The relevant questions would have had to have been included in the EPQ, since this is the only instrument where respondents were required to consult establishment records, and hence may have had some adverse effect on response to this component of the survey. Second, it may have been felt that many employers would not have kept the appropriate records to provide sufficiently accurate information.

The AWIRS, therefore, merely gathered information on whether any actions of different types occurred during the 12 months prior to survey. Consequently, we use as our measure of strike activity a binary variable indicating whether a strike had occurred at any time within the 12 month reference period. Similar variables are at the centre of analyses of the 1980 and 1984 rounds of the British Workplace Industrial Relations Survey reported in Blanchflower and Cubbin (1986), Booth and Cressy (1990) and Machin et al (1992).

Both Blanchflower and Cubbin (1986) and Machin et al (1992) distinguish any industrial action from strikes. Similar distinctions are made here. In particular, we consider two dependent variables additional to the indicator of strike incidence described above. Constructed in an analogous fashion, these represent the incidence of stop-work meetings and other action, respectively, where 'other action' encompasses overtime bans or restrictions, go slows, picketing, work to rule and other bans.

### Explanatory Variables

The variables used to proxy the influences described in the previous section as well as details of their construction are provided in a Data Appendix and hence a detailed discussion of every explanatory variable is not necessary. Nevertheless, the following points should be noted.

i) Workplace size is measured using the data recorded in the EPQ rather than from responses by the general managers during their interview. We take the view that these data are likely to be far more accurate than the guesstimates provided by managers.

ii) The share of labour in total costs is used to control for capital-labour ratio effects.

iii) The measures of technological and organisational change indicate whether particular types of change had actually occurred in the last 12 months, whereas our hypotheses suggest that disputation would be related to proposed change, irrespective of whether that change subsequently took place or not.

iv) Union density is invariably used in the overseas literature as a measure of union power, and as such, is retained here. However, as Drago and Wooden have argued in a number of places (Drago and Wooden 1990, 1991, 1992, Drago et al

1992), density may well be a very poor measure of union activity and strength in the Australian system. They instead recommend measures which are more directly associated with union activity in the workplace. We experiment with a number of variables here, including the ratio of union delegates to employees, a binary variable indicating the presence of a full-time union delegate and a dummy variable which takes the value one if, in the opinion of management, employees would be most likely to send a union delegate to negotiate with management over some proposed change to a work practice (as compared with, for example, making direct representations or raising the matter at the next workplace meeting). We also include a dummy variable for non-union workplaces to control for the possibility that such workplaces might have characteristics very different from unionised workplaces irrespective of the level of that unionisation.

v) No direct measure of the extent to which unions are organised along occupational lines is provided in the AWIRS. However, information on the size of the major union present was collected, and large unions are, almost by definition, less likely to have an enterprise focus (though admittedly union size may well confuse the effects of structure with that of power, given large unions have more resources).

vi) Worker characteristics are captured with variables representing the proportion of the workforce who are female, working part-time, employed on a casual basis and working in blue-collar occupations, and dummy variables for average workforce age and proportion of workforce employed at the workplace for ten years or more. In addition, as a better indicator of the importance of firm-specific capital, a measure of the importance of on-the-job training is included. Another dummy variable, this variable takes the value one if the average job (amongst workers from the largest occupation) requires at least a year before a new recruit can expect to achieve the standard expected of his or her co-workers.

vii) The potential effects of communication and cooperation are allowed for through the inclusion of a series of dummy variables indicating the presence of different arrangements designed to facilitate to some extent intra-workplace communication and cooperation.

viii) A measure of employee influence on the production process was constructed, following Drago and Wooden (1992), from responses to a questions asking managers to rate, on a six point scale, the amount of influence workers (from the largest occupational grouping) have over three types of workplace decisions: how work is allocated, how the job is performed and the pace of work. Responses were then normalised to zero and summed to create a simple additive scale ranging from 0 to 15.

ix) As in Drago and Wooden (1990), no direct measure of the extent of piece rate pay systems is available. Instead a variable measuring the percentage of non-managerial employees receiving any form of performance-related pay during the previous year is included.

x) Taking the lead of Wooden (1991), the influence of formal grievance procedures is tested for with the inclusion of a dummy variable signalling not just whether formal written procedures are present, but whether they are used 'all the time'.

xii) In an attempt to isolate the effect of corporate bureaucracy, we incorporate a measure of the extent to which a range of decisions which affect the workplace are actually made at the workplace rather than at higher levels in the organisation which was constructed by the AWIRS team. Described in more detail in Callus et al (1991, pp.80-82), a high value on this index actually signals relatively little workplace autonomy.

xii) The measure of relative pay used is due to Drago and Wooden (1992) and is constructed by first obtaining a distribution of pay ranges within each occupational category for the entire sample and then calculating the proportion of employees in occupation groups where most employees receive a pay packet which places them in the top quartile of their occupation.

xiii) Three variables are used to represent non-pecuniary employment benefits: the first controls for the presence of employer contributions to superannuation; the second is an indicator of the extent of other fringe benefits; while the third, the proportion of workers in receipt of workers' compensation, is used to capture differences in physical working conditions. Requiring some explanation, the measure of fringe benefits is a count of the number of the following types of benefits provided to the majority of employees: child care facilities; recreation and fitness facilities; medical and dental care; discount's on the organisation's products or services; housing finance or assistance; provision of clothing or clothing allowance; and a social club. It thus has a minimum value of zero and a maximum value of seven.

xiv) Profit (or as measured in the AWIRS  $\bar{D}$  the pre-tax rate of return on investment) only has any meaning for those firms which operate on a commercial basis (ruling out many public sector organisations, for example) and for those workplaces which are profit centres. As such, the role of profit can only be tested using a sub-sample of the observations. Largely for space reasons, these results are not presented here, but in the main do not indicate a large role for profitability in influencing strike activity, though the estimated sign was consistently negative.<sup>6</sup>

No direct measure of volatility in profit levels is available, but managers were asked about their perception of the stability of the market their organisation faces. These responses were used to construct a measure of overall economic uncertainty which, given asymmetric information theories, should be associated with a greater incidence of strikes.

xv) Market power is typically measured with market share variables or, alternatively, with measures of the level of concentration within the industry. Neither of these approaches could be used here because of the lack of relevant data. We, therefore, rely on responses to a question asking the General Manager to describe the intensity of competition for the main product or service produced at the workplace.<sup>7</sup>

xvi) The proportion of the workforce working overtime during the month prior to the survey is used as an indicator of labour market tightness. High levels of

<sup>6</sup> These results are reported in Dawkins and Wooden (1993).

<sup>7</sup> As noted above, the concept of  $\bar{O}$ market competition $\bar{O}$  was meaningless for workplaces classified as operating on a non-commercial basis. To minimise observation loss, we have, therefore, assigned such workplaces a zero value in the construction of this variable.

overtime reflect strong local labour market conditions and so, following Tracy (1986), should attract a positive sign.

xvii) In an attempt to capture the impact of industrial relations influences coming from outside the workplace, we include a dummy variable which indicates whether there had been any disruption to the production of goods or provision of services at the workplace as a result of industrial action elsewhere. Additionally, inter-industry differences in strike proneness are also likely to reflect differences in the external industrial relations environment, and hence a set of nine industry dummies are included (though these arguably will control for any remaining systematic differences across firms and workplaces located in different industries).

## RESULTS

Since the dependent variables are all binary, the estimation method used is probit analysis. The probit model relates the expected probability of an event occurring,  $r$ , to the vector of explanatory variables,  $X$ , by

$$p = \Phi(\alpha + \beta X)$$

where  $\Phi$  is the normal cumulative distribution function and  $\alpha$  and  $\beta$  are parameters to be estimated. Estimation is undertaken using the probit procedure in the econometric package, LIMDEP (version 5.1).

The full results are presented in Appendix Table A1.<sup>8</sup> A summary of the direction of estimated relationships, however, can be found in Table 1. In particular, we indicate for each dependent variable whether the estimated relationship with each of the explanatory variables is positive, negative or insignificant, and in the case of significant relationships, whether the evidence provides strong or weak support.

## Strikes

The results for the strikes model are presented in the first two columns of Table A1 and in general it appears that the model works well. The pseudo R-squared measures are very high for data of this type and moreover, produce a substantial reduction in forecasting error (in the order of almost 50 per cent). Even heteroscedasticity is not found to be problematic.<sup>9</sup>

Turning now to Table 1, in the list of variables that seek to capture the effects of workplace and firm characteristics, both workplace size and firm size stand out as being highly significant (at the one per cent level). As expected, the strong positive

<sup>8</sup> For each of the three dependent variables, two specifications are reported; one using unweighted data and the other weighted data. Note that the appropriate weights apply to respondents to the EPQ (the variable SCQWT) rather than the overall sample (GMQWT). We are indebted to Mark Cully for pointing this out. We also experimented with more parsimonious equations where those variables where the problem of endogeneity seemed most likely were omitted. In the main, our results were little affected (see Dawkins and Wooden 1993).

<sup>9</sup> The test used follows Greene (1992, p. 432) and has a chi-square distribution with  $k$  degrees of freedom. In the weighted specification the test statistic obtained was 7.6.

TABLE 1: SUMMARY OF PROBIT REGRESSION RESULTS

Variable	Strikes	Stop-work meetings	Other industrial action
Workplace size	++	++	ns
Firm size	Q(+/-)	Q(+/-)	Q(+/-)
Labour intensity	Q(-/+)	ns	ns
Shift work	--	--	ns
Foreign ownership	ns	ns	ns
Public ownership	-	ns	ns
Workplace age	ns	ns	--
Technological change	-	-	-
Organisational change	++	ns	++
Union density	++	ns	ns
Non-union workplace	ns	--	ns
Union activity in workplace	++	++	++
Number of unions	ns	++	++
Union size	+	ns	ns
% female	ns	ns	ns
% part-time	-	-	ns
% casual	ns	ns	ns
% blue-collar	ns	ns	-
Workforce age	ns	-	ns
Tenure	-	ns	ns
Firm-specific human capital	-	ns	ns
Communication structures	ns	++	++
Information provision	ns	-	ns
Employee influence	ns	+	ns
IR training for supervisors	+	ns	ns
Profit-sharing	ns	ns	ns
Performance-related pay	ns	ns	ns
Grievance procedures	-	ns	-
Workplace management autonomy	ns	ns	ns
Company awards	ns	ns	ns
Federal awards	ns	ns	ns
Relative pay	+	+	++
Fringe benefits	-	ns	--
Superannuation	ns	ns	ns
Injury rate	ns	ns	++
Market uncertainty	ns	ns	-
Market competitiveness	ns	ns	ns
Demand	ns	ns	ns
Overtime	ns	++	++
External strike action	++	++	++

Notes: ++ and -- indicate strong support for positive and negative relationships, respectively.  
 + and - indicate weak support for positive and negative relationships, respectively.  
 Q indicates evidence of a quadratic relationship.

relationship between workplace size and strike incidence found in all previous research is borne out in these data. Somewhat differently, firm size is also of importance, with strike incidence in general being higher in large organisations, though there does appear to be a slight 'falling away' of the effect after a firm size of 10,000 employees is reached.

Theoretical considerations suggest that the labour intensity variable (share of labour in total costs) will be affected by forces pushing in opposing directions. The results suggest that these opposing forces can be accommodated if labour intensity is specified in quadratic form. In particular, it is found that strike activity is most pronounced in workplaces which are either very capital intensive or very labour intensive.<sup>10</sup>

Shiftwork is found to be negatively associated with strike occurrence (especially in the weighted model), providing strong support for the hypothesised 'fragmentation effect' of shiftwork. The variables relating to foreign ownership, the public sector and age of workplace are generally insignificant (though there is some weak evidence to support the hypothesised inverse relationship between strike incidence and public sector ownership). Organisational change, however, does attract the expected positive sign. Technological change, on the other hand, contrary to expectation, is found to have a negative effect, though the coefficient is only weakly significant (at the ten per cent level).

In the list of variables included to capture the effect of unions, union density stands out as being highly significant (at the one per cent level), attracting the expected positive sign. Other measures of union presence and activity (delegates per employee, presence of a full-time delegate and delegate activity) are also found to exert significant positive influences. The number of unions present, however, is not found to be significant, though it must be admitted that multicollinearity with other union variables may be clouding relationships here. Wooden and Balchin (forthcoming), for example, find the number of unions one of the most important determinants of union density in the AWIRS data. Multiple unionism may also be correlated (positively) with union size and some evidence for the hypothesised positive impact of union size on strike activity is found (in the weighted results).

The workforce characteristics variables are, in general, insignificant, though the proportion of part-time employees in the workforce has the expected significant negative sign (at the five per cent level) in the unweighted results. Additionally, some evidence for the postulated inverse relationship between possession of firm-specific capital and strike probabilities is found, with either tenure or our more direct indicator at least weakly significant in the two specifications.

Turning to the internal industrial relations (IR) environment variables, the key finding here is the overall lack of significance, with only one variable (the presence of grievance procedures which are used all the time) significant at the five per cent level in either equation. As far as the bargaining issues are concerned, relative pay is significant in the unweighted results but attracts the wrong sign; indicative of an endogeneity problem, with relative pay likely to be effected by such factors as

10

Strike incidence is estimated to be lowest where labour accounts for about 43 per cent of total costs.

unionisation and strikes.<sup>11</sup> Fringe benefits, however, has the expected negative sign.<sup>12</sup>

With respect to the economic and external environment variables, all are insignificant except for the external strike action variable, which has the expected positive sign.

### Stop-work Meetings

As with the strikes model, both large workplaces and large firms are found to be associated with a greater incidence of stop-work meetings. The other variables that seek to capture the effects of workplace and firm characteristics are all insignificant, with the exception of technological change which is negative and weakly significant in the unweighted equation.

In contrast to the strikes model, neither union density nor union size appears to be of large significance for whether stop-work meetings occur. Instead, the effects of union power are better captured with a dummy variable for non-union workplace (negatively signed) while the effects of union structure are now captured by the number of unions, with the incidence of stop-work meetings rising with the number of unions present. The former result implies that the occurrence of stop-work meetings, while dependent on a union presence, is not linked to the actual number of union members, while the latter result reflects the tendency for unions to hold stop-work meetings separately. Aside from these two variables, the three indicators of union activity are also highly significant, just as they were in the strikes model.

As in the strikes model, the workplace characteristics variables are, in general, insignificant, though weak relationships do exist for the both percentage of part-time employees and the percentage of young persons in the workforce.

Most of the internal IR environment variables are also generally insignificant, but surprisingly, the presence of task forces has a highly significant positive sign, contrary to our original expectation. Similarly, the quality circles variable attracts a positive and weakly significant coefficient in the weighted results. The distinct possibility of reverse causation, however, must again be noted.

As far as bargaining issues are concerned, relative pay again attracts the incorrect sign, but again is significant only in the unweighted results. The level of fringe benefits, on the other hand, is not a significant factor in explaining why stop-work meetings might arise.

Of the economic and external environment variables, in addition to external strike action, the level of overtime is highly significant; with the positive coefficient indicating that the incidence of stop-work meetings is greater in workplaces confronted by tighter local labour market conditions, as suggested by Tracy (1986).

---

11 Instrumenting the relative pay variable sees the sign on the variable change, but the coefficient does not achieve statistical significance. Moreover, our other results are qualitatively unaffected.

12 The fringe benefits variable is far less likely to be affected by reverse causality if fringe benefits are the subject of relatively infrequent renegotiation.

## Other Industrial Action

Again the results suggests industrial action is most pronounced in large firms. However, in contrast to the other models, workplace size is insignificant. Other significant variables in the firm/workplace characteristics group are: workplace age with a variable indicating 'older workplace' attracting the expected negative result (a result that is specific to this model); technological change which, as found in the other models, attracts a negative sign though only achieves significance in the unweighted results; and organisational change, which has the expected positive effect.

Of the union variables, it is the delegate presence and activity variables, along with the number of unions, that are highly significant, and positive.

Among the workforce characteristics, it is only the percentage of blue collar in the workforce that is even weakly significant. The negative sign, however, is not in keeping with other research findings, though may possibly indicate a greater propensity for white-collar workers to use bans and the like in preference to complete stoppages.

Looking at the internal IR environment, communication structures again emerge as having a perverse positive impact on the incidence of industrial action. This arises through the impact of two specific variables  $\text{D}$  the presence of task forces and the presence of joint consultative committees. Again these findings suggest the possibility of reverse causation, though the positive sign on joint consultative committees may reflect collinearity between this variable and union activity. The presence and use of grievance procedures is also found to exert the expected significant negative effect on industrial action (at least once the data are weighted).

Of the bargaining issues variables, as in the strikes model, the relative pay variable is positively signed while the fringe benefits variable is negatively signed. A new finding, however, is the significant positive coefficient on the injury rate which, according to our hypothesis, signals a relationship between the occurrence of industrial action and safety problems at the workplace.

Economic influences are again relatively unimportant except for labour market effects, as reflected in the overtime variable which has a significant positive effect. Of some note, unlike the previous types of industrial action, bans and the like are not significantly influenced by strike action which has occurred elsewhere.

## CONCLUSIONS

This paper drew upon a substantial literature on the factors that cause and/or are associated with the incidence of industrial action to develop empirical models of three forms of industrial action using the AWIRS. Despite the crude nature of the dependent variables, all three models seemed to perform extremely well. Moreover, while a number of variants of the basic model were estimated, in the main these variations do not substantially affect the major findings. What then are these major findings?

First, firm size is an important determinant of industrial action, as revealed in all three models. The probability of industrial action of any type is much greater in large organisations, though the relationship is clearly not monotonic. Indeed, there is evidence to suggest that after a firm size of between five and ten thousand employees is reached, strike probabilities decline, perhaps as a result of greater expenditure on dispute prevention by the large conglomerates.

As expected, workplace size is also positively related to industrial action (though not with the other industrial action category). The evidence also suggests that organisational change has a positive effect on industrial action, although not on stop-work meetings. Perhaps stop-work meetings are concerned with more immediate issues? In contrast, the results presented here tend to indicate that technological change is negatively associated with industrial action. While contrary to expectation, it is consistent with the previous results reported in Drago et al (1992), and may reflect the nature of workforces in industries where technological innovation is more frequent.

The variables capturing the presence of unions and the level of union activity also confirm, as expected, the major role of unions in influencing industrial action. As unions are the agent of industrial action, this comes as no surprise. While it is difficult to disentangle the various union effects, because of possible multicollinearity, there is evidence to suggest that union membership is outperformed by more direct indicators of union activity within the workplace. The importance of union structure identified by Drago et al (1992) was also confirmed, with multiple unionism a significant influence on stop-work meetings and 'other' industrial action, and union size positively related to strike incidence.

External strike action is also found to have positive effects, but generally not in the other industrial action model. Economic influences, on the other hand, did not appear to be of great importance in these data. The proxy for labour market conditions, overtime levels, however, was found to have a positive effect on stop-work meetings and other industrial action. Given overtime reflects local labour market conditions, this finding is consistent with expectations.

While the models seem to work well and the results are not uninteresting, the weaknesses of the analysis cannot be ignored. Ultimately, the value of any empirical work is constrained by the quality of the data and clearly the AWIRS data are relatively poor when it comes to the measurement of industrial action. More powerful analyses of industrial action would be rendered by data which provide an indication of not just whether any action had occurred, but the frequency of such actions and their severity (in terms of workings days lost for example). Hopefully, this deficiency in the data will be corrected in any future rounds of the AWIRS.

With respect to explanatory variables, the AWIRS data are far superior. Nevertheless, it must be admitted that with respect to obtaining an adequate assessment of managerial style and quality the AWIRS is deficient. This is especially unfortunate given that grievance procedures, management-employee communications, employee involvement in decision making and the like are policy relevant variables that could provide employers, unions and government with some guidance about ways of averting industrial action. However, as Drago et al (1992) also found, management surveys are not very good vehicles for obtaining information about management; instead this is better accessed via case-studies or through data gathered from employees. Thus, it is not surprising that few of the

variables included to capture the influence of the internal IR environment performed with much success.

Interpretation of these variables was also clouded by the related problems of multicollinearity, endogeneity and reverse causation. Future research may, therefore, be better advised to concentrate on the possibility of interactions between the internal IR environment variables and those variables which we identify here as being most significant (and consistently so), such as firm and workplace size and union activity and structure.

Finally, some comment about the use of weighting is warranted. While the results with the weighted data are, in general, very similar to those for the unweighted data (see Table A1), a number of interesting and annoying differences do occur. In the strikes model, for example, the positive union size result only emerges after the data are weighted while the significant associations with part-time employment and grievance procedures disappear once the data are weighted. Which results are preferred? We must admit we do not know the answer to this question. Weighted data are preferred if there are significant biases arising out of the stratification process used to obtain the sample (that is, unweighted data will give undue emphasis to the observations from over-sampled groups). On the other hand, there may be statistical problems associated with the use of weighted data.

APPENDIX TABLE A1: PROBIT RESULTS

Variable	Strikes		Stop-work meetings		Other industrial action	
	Unwtd.	Wtd.	Unwtd.	Wtd.	Unwtd.	Wtd.
Constant	-3.182 (5.42)**	-2.616 (4.48)**	-2.252 (4.81)**	-2.157 (4.41)**	-2.973 (5.32)**	-2.971 (5.10)**
Workplace size (x1000)	0.476 (3.49)**	0.740 (3.01)**	0.310 (2.30)*	0.245 (2.21)*	0.100 (0.78)	0.148 (0.65)
Firm size: 100-499	0.103 (0.46)	0.106 (0.51)	0.280 (1.60)	0.317 (1.91)#	0.211 (0.94)	0.174 (0.83)
Firm size: 500-999	0.257 (1.04)	0.136 (0.53)	0.243 (1.18)	0.279 (1.28)	0.322 (1.28)	0.563 (2.26)**
Firm size: 1000-4999	0.344 (1.45)	0.388 (1.68)#	0.208 (1.06)	0.237 (1.21)	0.103 (0.43)	0.244 (1.04)
Firm size: 5000-9999	0.814 (3.13)**	0.746 (2.78)**	0.617 (2.69)**	0.633 (2.57)*	0.668 (2.52)*	0.699 (2.52)*
Firm size: 10000- 19999	0.602 (2.14)*	0.569 (1.90)#	0.500 (1.97)*	0.691 (2.50)*	0.594 (2.10)*	0.827 (2.84)**
Firm size: 20000+	0.658 (2.61)**	0.536 (2.11)*	0.579 (2.69)**	0.689 (3.10)**	0.557 (2.15)*	0.556 (2.15)*
Share of labour in total costs	-0.654 (0.78)	-2.351 (2.57)*	-0.175 (0.23)	-0.483 (0.59)	1.005 (1.17)	0.797 (0.84)
Share of labour in total costs squared	1.214 (1.47)	2.752 (3.02)**	0.383 (0.50)	0.435 (0.53)	-0.677 (0.80)	-0.686 (0.74)
Shift work	-0.256 (1.73)#	-0.607 (3.11)**	-0.188 (1.38)	-0.428 (2.58)**	-0.001 (0.01)	-0.098 (0.56)
Foreign ownership	0.147 (0.89)	0.281 (1.43)	0.053 (0.35)	0.031 (0.18)	0.090 (0.53)	0.125 (0.62)
Public sector	-0.352 (1.79)#	-0.372 (1.57)	-0.115 (0.65)	0.045 (0.22)	-0.093 (0.46)	-0.039 (0.17)
Old workplace	-0.135 (1.17)	-0.193 (1.44)	-0.123 (1.17)	-0.090 (0.78)	-0.291 (2.47)*	-0.272 (2.05)*
New workplace	-0.322 (1.55)	-0.405 (1.75)#	-0.166 (0.94)	-0.121 (0.62)	-0.113 (0.57)	0.094 (0.46)
Technological change	-0.171 (1.68)#	-0.209 (1.79)#	-0.171 (1.88)#	-0.133 (1.32)	-0.107 (1.06)	-0.197 (1.73)#

(continued)→

Variable	Strikes		Stop-work meetings		Other industrial action	
	Unwtd.	Wtd.	Unwtd.	Wtd.	Unwtd.	Wtd.
Organisational change	0.441 (3.06)**	0.413 (2.67)**	0.091 (0.76)	0.103 (0.81)	0.318 (2.17)*	0.371 (2.31)*
Union density	0.729 (2.73)**	0.864 (2.97)**	0.339 (1.49)	0.355 (1.45)	0.290 (1.07)	0.355 (1.18)
Non-union workplace	-4.682 (0.02)	-5.181 (0.01)	-1.025 (2.46)*	-0.816 (2.28)*	-0.226 (0.58)	0.104 (0.29)
Delegates per employee	6.370 (3.16)**	6.173 (2.87)**	5.892 (3.14)**	6.75 (3.51)**	6.171 (2.92)**	2.738 (1.28)
Full-time delegate present	0.422 (2.28)*	0.640 (2.46)*	0.687 (3.34)**	0.963 (3.25)**	0.718 (3.76)**	1.038 (3.86)**
Delegate activity	0.250 (2.22)*	0.268 (2.20)*	0.396 (3.95)**	0.402 (3.78)**	0.456 (3.94)**	0.532 (4.34)**
Number of unions	0.023 (1.00)	0.003 (0.08)	0.065 (2.92)**	0.081 (2.53)*	0.101 (4.42)**	0.10 (3.28)***
Union size: 5-35000	0.083 (0.43)	0.259 (1.19)	-0.025 (0.14)	-0.126 (0.66)	0.040 (0.21)	0.039 (0.19)
Union size: 35-75000	0.285 (1.53)	0.354 (1.66)#	0.126 (0.74)	0.092 (0.50)	-0.003 (0.01)	0.015 (0.07)
Union size: >75000	0.262 (1.48)	0.457 (2.17)*	0.228 (1.42)	0.161 (0.89)	0.050 (0.28)	-0.029 (0.14)
% female	0.348 (1.31)	0.379 (1.30)	-0.035 (0.14)	0.152 (0.58)	-0.086 (0.31)	0.120 (0.40)
% part-time	-0.846 (2.13)*	-0.664 (1.58)	-0.666 (1.87)*	-0.643 (1.71)#	-0.191 (0.44)	-0.044 (0.10)
% casual	-0.577 (1.23)	-0.523 (1.03)	-0.272 (0.68)	-0.653 (1.48)	-0.332 (0.67)	-0.471 (0.90)
% blue-collar	0.048 (0.20)	-0.012 (0.05)	0.099 (0.48)	0.087 (0.38)	-0.467 (1.86)#	-0.524 (1.87)#
Young workers	-0.143 (0.55)	-0.187 (0.65)	-0.412 (1.71)#	-0.415 (1.51)	-0.155 (0.56)	-0.045 (0.15)
Older workers	-0.150 (0.88)	-0.131 (0.58)	0.109 (0.71)	0.278 (1.51)	-0.276 (1.60)	-0.184 (0.85)

(continued)→

Variable	Strikes		Stop-work meetings		Other industrial action	
	Unwtd.	Wtd.	Unwtd.	Wtd.	Unwtd.	Wtd.
Tenure	-0.310 (1.72)#	-0.394 (1.70)#	-0.191 (1.23)	-0.086 (0.47)	-0.008 (0.05)	0.199 (0.85)
Firm-specific human capital	-0.441 (2.20)*	-0.188 (0.95)	-0.094 (0.57)	-0.009 (0.05)	-0.019 (0.11)	0.144 (0.83)
Senior management – employee meetings	-0.143 (1.21)	-0.188 (0.95)	-0.017 (0.16)	-0.045 (0.39)	-0.093 (0.78)	0.048 (0.35)
Task forces, etc.	0.221 (1.87)#	0.200 (1.40)	0.343 (3.18)**	0.328 (2.60)**	0.245 (2.09)*	0.068 (0.48)
Employee – supervisor meetings	-0.207 (1.83)#	-0.093 (0.74)	0.011 (0.11)	0.012 (0.11)	0.065 (0.56)	-0.011 (0.09)
Joint consultative committees	0.169 (1.35)	0.071 (0.45)	0.030 (0.26)	-0.078 (0.55)	0.343 (2.80)**	0.351 (2.35)*
Quality circles	0.149 (1.11)	0.182 (1.11)	0.181 (1.45)	0.281 (1.96)#	-0.026 (0.19)	-0.048 (0.29)
Codetermination	-0.098 (0.52)	-0.186 (0.84)	-0.180 (1.05)	-0.067 (0.36)	-0.103 (0.57)	-0.006 (0.03)
Information provision	0.006 (0.05)	-0.139 (0.91)	-0.173 (1.40)	-0.239 (1.74)#	-0.070 (0.53)	-0.100 (0.67)
Employee influence	0.008 (0.45)	0.021 (1.07)	0.015 (0.95)	0.039 (2.24)*	0.027 (1.56)	0.024 (1.24)
IR training for supervisors	0.001 (0.01)	0.231 (1.83)#	-0.022 (0.22)	0.058 (0.50)	0.060 (0.51)	0.085 (0.68)
Profit-sharing	-0.272 (0.62)	-0.284 (0.54)	0.226 (0.68)	-0.154 (0.43)	-0.261 (0.60)	-0.499 (0.94)
Performance-related pay	0.075 (0.35)	0.003 (0.34)	-0.060 (0.31)	-0.138 (0.67)	-0.110 (0.49)	-0.165 (0.65)
Grievance procedures present and used all the time	-0.350 (2.13)*	-0.290 (1.45)	-0.056 (0.39)	-0.077 (0.45)	-0.226 (1.41)	-0.492 (2.46)*
WP management autonomy	0.001 (0.47)	0.003 (1.13)	-0.003 (1.38)	-0.004 (1.49)	0.000 (0.15)	0.001 (0.46)
Company awards	-0.045 (0.26)	-0.193 (0.84)	-0.003 (0.02)	-0.213 (1.04)	0.109 (0.63)	-0.018 (0.08)

(continued)→

Variable	Strikes		Stop-work meetings		Other industrial action	
	Unwtd.	Wtd.	Unwtd.	Wtd.	Unwtd.	Wtd.
Federal awards	0.017 (0.16)	-0.081 (0.66)	0.101 (1.05)	-0.023 (0.21)	0.151 (1.38)	-0.019 (0.16)
Relative pay	0.360 (2.28)*	0.228 (1.22)	0.340 (2.35)*	0.236 (1.47)	0.303 (1.96)#	0.365 (2.07)*
Fringe benefits	-0.086 (1.89)#	-0.126 (2.31)*	0.028 (0.70)	-0.013 (0.28)	-0.100 (2.23)*	-0.086 (1.69)#
Superannuation	0.076 (0.41)	-0.086 (0.44)	0.030 (0.18)	-0.086 (0.52)	0.059 (0.32)	-0.055 (0.29)
Injury rate	2.895 (1.09)	3.420 (1.19)	3.883 (1.61)	3.450 (1.36)	6.246 (2.39)*	7.492 (2.70)**
Unpredictable market	-0.202 (1.47)	-0.106 (0.70)	-0.180 (1.50)	-0.081 (0.64)	-0.203 (1.46)	-0.308 (2.00)*
Market competitiveness	0.029 (0.71)	0.074 (1.53)	0.011 (0.31)	0.034 (0.85)	-0.024 (0.61)	0.014 (0.31)
Demand expanding	-0.013 (0.13)	-0.167 (1.45)	-0.027 (0.30)	-0.099 (0.98)	-0.009 (0.09)	0.002 (0.02)
Overtime	0.265 (1.30)	0.196 (0.82)	0.577 (3.17)**	0.614 (3.00)**	0.597 (2.90)**	0.619 (2.59)**
External strike action	0.339 (3.25)**	0.388 (3.22)*	0.253 (2.64)**	0.323 (3.07)**	0.169 (1.59)	0.182 (1.53)
Log likelihood	-467.10	-370.91	-573.03	-485.68	-454.17	-377.86
Likelihood ratio	431.33**	623.72**	549.16**	723.86**	462.77**	615.38**
Cragg-Uhler R-squared	0.43	0.58	0.47	0.58	0.41	0.57
Reduction in prediction error	0.51	0.46	0.55	0.52	0.55	0.50
No. of observations	1370	1370	1370	1370	1370	1370

Notes: Figures in brackets are asymptotic t-ratios.

\*\* , \* and # indicate significance at the one, five and ten per cent levels, respectively, in a two-tailed test.

Though not reported, all specifications also include industry dummies.

## DATA APPENDIX: VARIABLE DESCRIPTION AND CONSTRUCTION

Variable	AWIRS name	Variable description and construction details
Incidence of strike action	EN1A	Dummy variable = 1 if any strike had taken place at workplace in last year
Incidence of stop-work meetings	EN1B	Dummy variable = 1 if any stop-work meetings had taken place at workplace in last year
Incidence of 'other' industrial action	EN1C to EN1G	Dummy variable = 1 if any overtime bans or restrictions, go slows, picketing, work to rule or other bans had taken place at workplace in last year
Workplace size	EMP (Q1 from SCQ)	Number of employees in workplace
Firm size: 100-499	GA11	Dummy variable = 1 if 100 to less than 500 employees work for organisation
Firm size: 500-999	GA11	Dummy variable = 1 if 500 to less than 1000 employees work for organisation
Firm size: 1000-4999	GA11	Dummy variable = 1 if 1000 to less than 5000 employees work for organisation
Firm size: 5000-9999	GA11	Dummy variable = 1 if 5000 to less than 10000 employees work for organisation
Firm size: 10000-19999	GA11	Dummy variable = 1 if 10000 to less than 20000 employees work for organisation
Firm size: 20000+	GA11	Dummy variable = 1 if 20000 employees or more work for organisation
Share of labour in total costs	GC1	Mid-point of ranges: 1=0.1, 2=0.3, 3=0.5, 4=0.7, 5=0.9
Shift work	ED5	Dummy variable = 1 if all or most employees work rotating shifts
Foreign ownership	GA4	Dummy variable = 1 if workplace wholly or predominantly foreign owned
Public sector	G7	Dummy variable = 1 if workplace part of government business enterprise, statutory authority or public service dept.
Old workplace	GA3	Dummy variable = 1 if workplace in operation 50 years or more
New workplace	GA3	Dummy variable = 1 if workplace in operation less than 5 years
Technological change	GE1A & GE1G	Dummy variable = 1 if in last two years workplace had been affected by major change in product or service or introduction of major new plant, equipment or office technology
Organisational change	GE1B to GE1F	Dummy variable = 1 if in last two years workplace had been affected by major restructuring of how work is done, change in ownership, change to a more commercially oriented operation, reorganisation of management structure or change in senior management personnel
Union density	N40	AWIRS derived variable; % of workplace unionised

(continued) →

Non-union workplace	G1	Dummy variable = 1 if no union present
Delegates per employee	EK16	Number of union delegates per employee; EK16/EMP (set to 0 if G1=2)
Full-time delegate present	EK22	Dummy variable = 1 if union delegate who spends majority of time during work hours on union business is present (set to 0 if G1=2 or if EK16=0)
Delegate activity	EH5E	Dummy variable = 1 if, in response to a management proposal to change a work practice, concerned workers would be most likely to make representation to management via a union delegate
Number of unions	EK1	Number of unions at the workplace (set to 0 if G1=2)
Variable	AWIRS name	Variable description and construction details
Union size: 5-35000	N38	Dummy variable = 1 if major union has between 5 and 35 thousand members in Australia (set to 0 if G1=2)
Union size: 35-75000	N38	Dummy variable = 1 if major union has between 35 and 75 thousand members in Australia (set to 0 if G1=2)
Union size: >75000	N38	Dummy variable = 1 if major union has more than 75 thousand members in Australia (set to 0 if G1=2)
% female	Q's 1&2 from SCQ	% of total employees at workplace who are females; (FTPF+FTCF+PTPF+PTCF)/EMP
% part-time	Q's 1&2 from SCQ	% of total employees at workplace working part-time; (PTCT+PTPT)/EMP
% casual	Q's 1&2 from SCQ	% of total employees at workplace employed on a casual basis; (FTCT+PTCT)/EMP
% blue-collar	Q3 from SCQ	% of total employees at workplace working in jobs within the tradespersons, plant and machine operators and drivers, and labourers and unskilled workers occupation categories
Young workers	ED1A	Dummy variable = 1 if more than 25% of workforce below 20 years of age
Older workers	ED1B	Dummy variable = 1 if more than 25% of workforce over 50 years of age
Tenure	ED1E	Dummy variable = 1 if more than 50% of workforce have worked at workplace for more than 10 years
Firm-specific human capital	EJ16	Dummy variable = 1 if it takes a new employee (in largest occupational group in workplace working in a typical job) over a year to reach same standard expected of others in that same job classification
Senior management & employee meetings	EH1B	Dummy variable = 1 if regular meetings between senior management and employees used as method of communication within workplace
Task forces, etc.	EH1C	Dummy variable = 1 if task forces, ad hoc joint committees or working parties used as method of communication within workplace
Employee & supervisor meetings	EH1D	Dummy variable = 1 if regular meetings between employees and supervisors or line management used as method of communication within workplace

(continued) →

Joint consultative committees	EH1F	Dummy variable = 1 if on-going formal joint consultative committees used as method of communication within workplace
Quality circles	EH1G	Dummy variable = 1 if quality circles/productivity improvement groups used as method of communication within workplace
Codetermination	EH1I	Dummy variable = 1 if employee representatives on board of management/directors used as method of communication within workplace
Information provision	EH4A	Dummy variables = 1 if management regularly provides information to employees (if EH4A=1 AND EH4E=5 and (EH4C=3 OR EH4D=4) then dummy =1; otherwise =0)
Employee influence	EH7	Index of employee involvement in workplace decisions; (EH7A+EH7B+EH7C-3)
IR training for supervisors	EA20	Dummy variable = 1 if all or most first line supervisors are provided with formal training on employee relations
Profit sharing	EC6	% of non-managerial employees receiving any pay from a profit-sharing scheme in last year; mid-point ranges: 1=0.05, 2=0.175, 3=0.38, 4=0.63, 5=0.875, 6=1 (set to 0 if EC5=2)
Performance related pay	EC3	% of non-managerial employees who received performance related pay in last year; mid-point ranges: 1=0.05, 2=0.175, 3=0.38, 4=0.63, 5=0.875, 6=1 (set to 0 if EC1=2)
Grievance procedures present and used all the time	EM5 & EM10	Dummy variable = 1 if written grievance procedures are present and in the case of the 'main procedure. are followed 'all the time'
Workplace management autonomy	N33	AWIRS derived variable; index of workplace management autonomy ranging from 0 (complete autonomy) to 100 (very little autonomy)
Company awards	EB7F	Dummy variable = 1 if company/enterprise award applies at the workplace
Federal awards	EB7A	Dummy variable = 1 if federal awards apply at the workplace
Relative pay	Q's 3&14 from SCQ	% of occupational groups in top quartile for each specific occupation group
Fringe benefits	ED15	Index of extent of fringe benefits provided to majority of employees
Superannuation	ED14	% of non-managerial employees who are members of a superannuation scheme to which employer contributes; mid-point ranges: 0=0; 1=0.13, 2=0.38, 3=0.63, 4=0.875, 5=1
Injury rate	EG16/EM P	% of employees off work on workers compensation
Growth in profitability	GC5	Dummy variable = 1 if rate of return on investment in last financial year is higher than in the previous financial year

(continued)→

Unpredictable market	GB9	Dummy variable = 1 if demand for main product largely unpredictable
Market competitiveness	GB5	Index of degree of competition for main product or service (missing values from non-private sector workplaces set to 0)
Demand expanding	GB7	Dummy variable = 1 if demand for products expanding
Overtime	ED8	% of employees who have worked paid overtime in past month; mid-point ranges: 1=0.025, 2=0.075, 3=0.18, 4=0.38, 5=0.75
External strike action	EN11	Dummy variable = 1 if there had been any disruption to production of goods or provision of services at workplace as a result of industrial action elsewhere

Notes: We also experimented with a number of alternatives to the proxies described above. In particular, a measure of capacity utilisation (from GC2 ) was used as an alternative to the 'expanding demand' variable while a measure of the extent to which employers face difficulties filling vacancies (described in Drago and Wooden 1992) was used as an indicator of labour market tightness. Inclusion of these variables had little effect on the estimated models and, in general, were inferior to the preferred measures.

## REFERENCES

- Abowd, J.M. and Tracy, J.S. (1989), 'Market Structure, Strike Activity, and Union Wage Settlements', *Industrial Relations* 28, Spring, 227-50.
- Blanchflower, D. and Cubbin, J. (1986), 'Strike Propensities at the British Workplace', *Oxford Bulletin of Economics and Statistics* 48, February, 19-39.
- Booth, A. and Cressy, R. (1990), 'Strikes with Asymmetric Information: Theory and Evidence', *Oxford Bulletin of Economics and Statistics* 52, August, 269-91.
- Callus, R., Morehead, A., Cully, M. and Buchanan, J. (1991), *Industrial Relations at Work: The Australian Workplace Industrial Relations Survey*, AGPS, Canberra.
- Card, D. (1990), 'Strikes and Wages: A Test of the Asymmetric Information Model', *Quarterly Journal of Economics* 105, August, 625-59.
- Cousineau, J. and Lacroix, R. (1986), 'Imperfect Information and Strikes: An Analysis of Canadian Experience, 1967-82', *Industrial and Labor Relations Review* 39, April, 377-87.
- Dawkins, P. and Wooden, M. (1993), *The Incidence of Industrial Action in Australia: Evidence from the AWIRS*. Western Australia Labour Market Research Centre Discussion Paper, forthcoming.
- Dawkins, P., Wooden, M. and Bushe-Jones, S. (1992), *Grievance Procedures and the Incidence of Strikes*. Report to the Chamber of Commerce and Industry of Western Australia.
- Drago, R. and Wooden, M. (1990), 'The Determinants of Strikes in Australia', *Journal of Industrial Relations* 30, March, 32-52.
- Drago, R. and Wooden, M. (1991), 'Turnover Down Under: Trade Unions and Exit Behaviour in Australia', *Journal of Industrial Relations* 33, June, 234-48.
- Drago, R. and Wooden, M. (1992), *The Links Between Economic Performance and Industrial Relations: Evidence From AWIRS*. Industrial Relations Research Series No. 2, August. Department of Industrial, Canberra.
- Drago, R., Wooden, M. and Sloan, J. (1992), *Productive Relations? Australian Industrial Relations and Workplace Performance*, Allen and Unwin, Sydney.
- Edwards, P.K. (1981), 'The Strike-Proneness of British Manufacturing Establishments', *British Journal of Industrial Relations* 19, March, 135-48.
- Farber, H. (1978), 'Bargaining Theory, Wage Outcomes, and the Occurrence of Strikes: An Econometric Analysis', *American Economic Review* 68, June, 262-71.
- Gramm, C. (1986), 'The Determinants of Strike Incidence and Severity: A Micro-level Study', *Industrial and Labor Relations Review* 39, April, 361-76.

- Greene, W.H. (1992), *LIMDEP: User's Manual and Reference Guide, Version 6.0*, Econometric Software, Bellport.
- Gunderson, M., Kervin, J. and Reid, F. (1986), 'Logit Estimates of Strike Incidence from Canadian Contract Data', *Journal of Labor Economics* 4, April, 257-76.
- Ingram, P., Metcalf, D. and Wadsworth, J. (1991), *Strike Incidence and Duration in British Manufacturing Industry in the 1980s*, Centre for Economic Performance, Discussion Paper No. 48, August, London School of Economics.
- Kennan, J. (1986), 'The Economics of Strikes', in O. Ashenfelter and R. Layard (eds), *Handbook of Labor Economics, Volume II*, North-Holland, Amsterdam.
- Kriegler, R., Dawkins, P., Ryan, J. and Wooden, M. (1988), *Achieving Organisational Effectiveness: Case Studies in the Australian Service Sector*, Oxford University Press, Melbourne.
- Machin, S., Stewart, M. and Van Reenen, J. (1992), *The Economic Effects of Multiple Unionism: Evidence from the 1984 Workplace Industrial Relations Survey*, Centre for Economic Performance, Discussion Paper No. 66, March, London School of Economics.
- Mauro, M.J. (1982), 'Strikes as a Result of Imperfect Information', *Industrial and Labor Relations Review* 35, July, 522-38.
- Shorey, J. (1976), 'An Inter-industry Analysis of Strike Frequency', *Economica* 43, November, 349-65.
- Siebert, W.S. and Addison, J.T. (1981), 'Are Strikes Accidental?' *The Economic Journal* 91, June, 389-404.
- Swidinsky, R. and Vanderkamp, J. (1982), 'A Micro-econometric Analysis of Strike Activity in Canada', *Journal of Labor Research* 3, Fall, 455-71.
- Tracy, J. (1986), 'An Investigation into the Determinants of U.S. Strike Activity', *American Economic Review* 76, June, 423-36.
- Tracy, J. (1987), 'An Empirical Test of an Asymmetric Information Model of Strikes', *Journal of Labor Economics* 5, April, 149-73.
- Wooden, M. (1991), 'Grievance and Dispute Procedures: A Note on the Importance of Compliance', *Labour Economics and Productivity* 3, March, 61-71.
- Wooden, M. and Balchin, J. (forthcoming), 'Unionisation in Australia: Evidence from the AWIRS', *Economic Record*.

# Characteristics of Workplaces and Industrial Action Review of the AWIRS Data

Lawson K. Savery and Geoffrey N. Soutar

## INTRODUCTION

The relationship between industrial action and workplace performance has been of concern to researchers for a number of years (Stagner and Rosen 1965, McHugh 1991, Knight 1989, Hammer and Smith 1978). Indeed, Clark (1992) has argued that one such characteristic (absenteeism) might be a sensitive measure of the state of industrial relations as absence can be used to show dissatisfaction with the workplace (Staw and Oldham 1978, McShane 1984). If group dissatisfaction is high, absenteeism might be converted into more conventional industrial action such as bans or strikes, although this is more likely in unionised workplaces in which individual workers have some protection. Such arguments would suggest that absenteeism and labour turnover are more likely to be higher in non-union workplaces, supporting the exit/voice model suggested by Freeman and Medoff (1984). Employees in a non-unionised workplace are more likely to "exit" because of the possible victimisation of the individual. Unionised workers, because of their group strength, are more likely to "voice" their problems. The use of exit or voice processes may depend on the level of union density, with high density workplaces using voice process more.

While researchers have examined relationships between the level of industrial activity, particularly strikes, and a variety of workplace factors (Stagner and Rosen 1965, McHugh 1991, Knight 1989, Hammer and Smith 1978), the data needed to analyse relationships between patterns of industrial action and these factors have not generally been available. The Australian Workplace Industrial Relations Survey (AWIRS) provides such data as the information gathered within the survey included the types of industrial action that had taken place in the workplace in the year prior to the study. Consequently, the present research project used the AWIRS data base to examine the relationship between the various forms of industrial action collected, shown in Table 1, and the relationship between patterns of industrial action and various workplace factors, such as absenteeism, labour productivity and labour turnover. The research methods used to analyse the relevant parts of the AWIRS data base and the results obtained are outlined in the following sections.

## THE AUSTRALIAN WORKPLACE INDUSTRIAL RELATIONS SURVEY

The Australian Workplace Industrial Relations Survey (AWIRS) was conducted to correct a shortage of data on workplace industrial relations processes in Australia. Research in the past had tended to be industry-specific or to have concentrated on specific aspects of workplace industrial relations (for example see Zappala, 1988). Further, the fundamental changes which occurring in Australian industrial relations needed to be examined on a micro or workplace level.

The AWIRS study, which was undertaken between October 1989 and May 1990, was extremely wide reaching in its scope as it:

"sought to collect information that would meet two research objectives. The first was to describe the different patterns of workplace industrial relations in order to map out the key features of workplace industrial relations structures, processes and outcomes. The second was to collect data that would be useful for secondary analysis of why efficiency and equity outcomes differ at workplaces" (Callus, Morehead, Cully and Buchanan, 1991, pxviii).

Because of possible differences in the nature and structure of small and large workplaces, the study was undertaken using two surveys. An Australia-wide survey of 2004 workplaces of at least 20 employees, covering all industries except agriculture and defence, and a supplementary survey of 349 workplaces, from similar industries with between 5 and 19 employees, were conducted. The present study examines only the "large" workplace data base as earlier research found very little industrial activity in the "small" workplaces (Savery and Soutar 1992).

### THE PRESENT STUDY

The AWIRS collected data on the seven types of industrial action in Table 1, which also shows the proportions of workplaces that had experienced these various actions. As can be seen from the table, over half the sample had not experienced any industrial action in the year before the survey, suggesting relatively low levels of activity during this period. This was confirmed by the low mean number of such actions (1.2), although some workplaces had different experiences. Twelve percent had four or more such actions during the period. The most common type of action was the stop work meeting (40.5%). However, strikes (28.4%) and overtime bans (20.0%) were not uncommon. It is apparent that each of the forms was used in some workplaces and that more than one form was used in a number of cases. Consequently an examination of patterns of industrial action seems worthwhile.

**TABLE 1: INDUSTRIAL ACTIONS IN WORKPLACES (AWIRS DATA BASE)\***

Type of Action	Percent Experiencing Action
Strikes	28.4
Stop Work Meetings	40.5
Overtime Bans or Restrictions	20.0
Go Slow	5.8
Picketing	5.5
Work to Rule	8.0
Other Bans	12.0
No Industrial Action	51.7

\* Results after weighting by values suggested in Australian Workplace Industrial Relations Survey (AWIRS) 1989-1990: Technical Report and Data Release (1991).

It was decided to use correspondence analysis which is a form of nonmetric principal components analysis, to examine the industrial action patterns (Greenacre 1984; Lebart, Morineau and Warwick 1984; Hoffman and Franke 1986; Green, Schaffer and Patterson 1988). The procedure is useful when data are categorical, as in the present study, where workplaces have "experienced or have not experienced a form of industrial action". Correspondence analysis results can be interpreted in a variety of ways. Initially the total spatial variation in the rows and columns, which is termed "inertia", can be examined. Each eigenvalue shows the inertia explained by the relevant principal axis and the sum of the eigenvalues shows the total inertia contained in the representation. The inertia along each axis (or dimension) can be broken down into proportions explained by the various row or column points which, in this case, are the workplaces and industrial actions respectively. These proportions are termed "absolute contributions" and can be used in interpreting the various axes or dimensions. The relative contributions to inertia can be shown to be the relevant squared correlations (Hoffman and Franke 1986, p. 221) and the sum of these correlations across the dimensions used gives the "quality" of the results for the particular row or column variable. High "quality" suggests the results obtained provide a good representation of that aspect of the data, giving insight into the number of dimensions which should be retained and the adequacy of the analysis.

Correspondence analysis also provides coordinate values for each row and column point, which allows both the rows and the columns of a data matrix to be determined. Thus, in this case, workplaces and industrial actions could be calculated. Both pieces of information were used in the subsequent analysis, although the workplace values were of more interest as they were used to find the "industrial action pattern" within each workplace.

Following the procedure suggested by Green, Schaffer and Patterson (1988) and Soutar, Savery and Bickley (1988), these patterns were cluster analysed to find if there were distinct workplace groups with different industrial action patterns. Group membership was then used as the dependent variable in a discriminant analysis to find if there were differences across the workplace variables collected. The results obtained in these various analyses are outlined in the next section.

## RESULTS OBTAINED

One thousand two hundred and sixty five of the 2004 workplaces surveyed did not experience any industrial action. Consequently, these responses were put aside for the first phase of the analysis, although they were used in subsequent phases. The data from the remaining 739 workplaces that had experienced some form(s) of industrial action were set up as an "indicator matrix", as outlined in Hoffman and Franke (1986). The "doubled" 739 by 14 data matrix was subjected to multiple correspondence analysis using the SIMCA program (Greenacre 1986). Since a "scree diagram" of the eigenvalues suggested a clear elbow at 3 axes and the fourth eigenvalue was below the level suggested to be appropriate (Franke 1985), the three dimensional solution was used in the subsequent analysis. Using Greenacre's (1989) method it was found that the solution explained at least 60 percent of the variation in the data's inertia, suggesting that it provides a good representation of the data. The numerical results for the various information sources are shown in Table 2.

**TABLE 2 CORRESPONDENCE ANALYSIS RESULTS**

Name	Quality	Dimension 1		Dimension 2		Dimension 3	
		Relative Contrib	Relative Contrib	Relative Contrib	Relative Contrib	Relative Contrib	Relative Contrib
Strikes	665	110	28	546	233	10	4
Stop Work	895	52	5	31	5	813	146
Overtime Ban	469	425	148	0	0	44	28
Go Slow	523	344	170	156	128	22	20
Picketing	512	244	121	259	212	9	8
Work to Rule	586	342	151	128	94	116	93
Other Bans	355	340	148	0	0	14	11

The quality values suggest that the three dimensional solution fitted the data quite well, although "other bans" (0.355) had a relatively poor fit. Stop work meetings had the best fit (0.895). The absolute and relative contributions, which are shown in Table 2, suggest that the first principal axis is defined by forms other than strikes and pickets and stop work meetings, which are defined by the second and third dimensions, respectively. An examination of the principal ones coordinates, shown in Table 3, suggests that the positive end of the first dimension is related to having experienced the various industrial actions such as go slows while the negative end is related to not experiencing these actions. Similarly, the positive end of the second dimension is related to having experienced strikes or pickets while the positive end of the third dimension is related to experiencing stop work meetings. An analysis of the scores for the various forms of industrial action on the three dimensions suggested that go slow and work to rule actions tended to operate together, while

pickets occurred by themselves. The other forms (strikes, stop work meetings and bans) tended to occur in the same workplaces.

**TABLE 3 PRINCIPAL AXES DIMENSIONS**

	Name		Dimension 1	Dimension 2	Dimension 3
Experienced	Strikes	+	317	706	-94
	Stop Work	+	108	-83	428
	Overtime Ban	+	879	-6	284
	Go Slow	+	1939	-1307	-491
	Picketing	+	1647	1696	312
	Work to Rule	+	1260	-772	-734
	Other Bans	+	1191	-41	-245
Have Not Experienced	Strikes	-	-346	-772	102
	Stop Work	-	-480	368	-1898
	Overtime Ban	-	-483	3	-156
	Go Slow	-	-178	120	45
	Picketing	-	-148	-153	-28
	Work to Rule	-	-271	166	158
	Other Bans	-	-286	10	59

As already noted, correspondence analysis can "portray individual responses (centroids) in a reduced space (which can then be) clustered" (Green et al. 1988, p. 281) and this was done in the present case. The Howard and Harris (1966) clustering procedure, which groups objects (here workplaces) to minimise within group variance for each level of clustering, was used. The number of clusters was varied from 2 to 8 to decide the appropriate number of clusters, which was determined using the point biserial correlation, as suggested by Milligan and Mahajan (1980). The point biserial correlation varied from 0.45 for 2 clusters to 0.60 for 8 clusters, with a maximum of 0.66 for five clusters. Consequently the five group solution was used in subsequent analysis. The percentage of workplaces in each group that had experienced the various forms of industrial action are shown in Table 4.

**TABLE 4 PROPORTION OF WORKPLACES EXPERIENCING FORMS OF INDUSTRIAL ACTION**

Industrial Action Scale	Group 1	Group 2	Group 3	Group 4	Group 5	Sample Average
Strikes	0.57	0.52	0.30	0.96	0.71	0.52
Stop work meetings	0.00	0.97	1.00	0.99	1.00	0.82
Overtime bans	0.19	0.58	0.12	0.75	0.94	0.36
Go slow	0.03	0.25	0.00	0.01	0.71	0.08
Picketing	0.04	0.00	0.00	0.31	0.29	0.08
Work to rule	0.16	0.70	0.00	0.04	0.88	0.18
Other bans	0.14	0.25	0.03	0.38	0.82	0.19

It would appear that Group 1 workplaces, that comprise 7 per cent of the sample, have not been involved in much industrial action. They were about average on strikes, picketing and bans but well below average on stop work meetings, picketing and work to rule. This group was termed the "moderate activity" group. Group 2 workplaces, containing 5 per cent of the sample, were about average on strikes but well above average on stop work meetings, bans, go slows and work to rule. Consequently, they were termed the "high passive form" group. Group 3 workplaces, including 16 per cent of the sample, were the least industrially active, tending only to use stop work meetings and they were termed "low action" group. Group 4 workplaces, containing 7 per cent of the sample, were extremely active, especially in strikes and pickets. They were, therefore, termed the "strike prone" group. Group 5 workplaces, including 2 percent of the sample, were like Group 4 but tended to also use bans, go slows and work to rule more. Consequently, this was termed the "active" group. A sixth group, which contained 63 percent of the sample, were those workplaces that had not experienced industrial action and had been excluded from the correspondence analysis. These workplaces were termed the "non active" group and were included in the subsequent analysis.

The next stage in the analysis was to examine the workplace characteristics of the various groups, including the non active group, to find if they could be differentiated in any way to help in understanding the differences in their industrial action patterns. Since the dependent variable was "industrial action group" membership, which is nominally scaled, discriminant analysis was used to investigate differences (Klecka 1980). Two discriminant functions were found to be significant at the 1% level. Using the  $I^2$  statistic suggested by Peterson and Mahajan (1976) it was found the two functions explained 45 percent of the variance in the data, with the first function explaining 29 percent of the variance and the second function 16 percent. The results of the analysis can be shown graphically (Soutar and Clarke 1981). In this case the larger structural correlations are presented in Figure 1. The direction of the

vector shows the nature of the relationship, while the length shows its strength. The structural correlations are also shown in Table 5.

As can be seen from Figure 1 and Table 5, the number of employees in the workplace appears to be related to the level of industrial action experienced, as the "active groups" (4 and 5) had more employees whereas the "non active" group (6) had the least number of employees. The "highly active" groups (4 and 5) were also more likely to have high union activity and a greater number of unions while the "non active" group had fewer unions and low union activity. It is interesting that the groups 4 and 5 had the lowest percentage of females while group 6, the "non active" group had the second highest percentage the highest being group 1 the "moderate activity" group. The "highly active" workplaces also had a more structured management than the "low" or "non active" groups and employed more full-timers and core workers. It was also apparent that Group 4 and 5 workplaces were more likely to be seen as active workplace bargainers (SSDA 1991). Finally, it was found that manufacturing workplaces were more active while service workplaces tended to be inactive. Absenteeism, voluntary labour turnover and labour productivity were unrelated to patterns of industrial action.

**FIGURE 1: DISCRIMINANT MAP OF ACTION CLUSTERS**

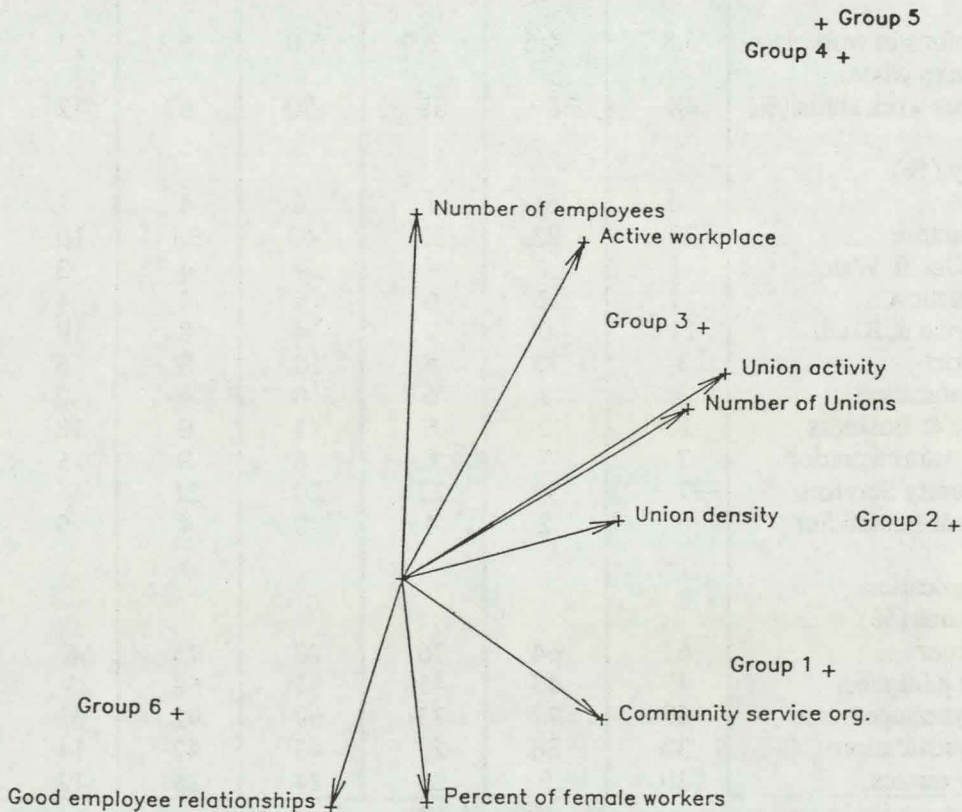


TABLE 5 GROUPS' WORKPLACE CHARACTERISTICS

Workplace Character	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Number of Employees	241	223	375	597	765	146
Average Earnings	507	560	493	536	536	478
Part-timers (%)	18	12	12	6	12	21
Non-core workers (%)	16	7	12	10	8	21
Employees on worker compo (%)	1.2	1.9	1.2	1.6	1.4	0.6
Female (%)	49	34	36	27	31	43
Workplaces where dominant occupation group is						
100% union	59	51	50	64	71	56
Union activity	52	74	63	79	75	18
Structured managemt (%)	72	64	69	77	83	36
Union density (%)	77	77	72	77	80	52
<b>Workplace Types (%)</b>						
Informal	1.4	0.0	0.6	0.0	0.0	16.5
Unstructured inactive	9.9	5.7	10.1	5.7	4.2	35.6
Structured inactive	14.1	3.8	5.6	2.9	4.2	14.6
Reactive bargainers	19.7	11.3	13.5	10.0	12.5	5.4
Active bargainers	25.4	37.7	42.1	61.4	54.2	7.0
No of unions in workplace	3.8	4.6	3.9	5.0	5.3	1.9
Workplaces where employees work shifts (%)	48	38	39	50	67	32
<b>Industry (%)</b>						
Mine	0	6	1	6	4	2
Manufacture	23	23	33	43	33	19
Elect, Gas & Water	1	7	4	4	4	3
Construction	1	2	6	6	4	4
Wholesale & Retail	11	0	7	4	8	19
Transport	3	13	5	10	8	5
Communication	3	8	6	0	4	2
Finance & Business	8	0	6	1	0	18
Public Administration	7	7	6	6	8	5
Community Services	37	32	22	20	21	14
Recrea & Person Ser	6	2	4	0	4	9
<b>Communication Techniques (%)</b>						
Newsletter	61	64	70	70	75	56
Ad hoc joint meet	49	43	45	51	58	23
Employee/supervisor	69	77	73	69	92	62
Joint consultation	38	36	28	43	42	14
Quality circles	20	9	25	24	25	12

## CONCLUSIONS

Certain industrial actions were found to be related. For instance, "go slows" and "work to rule" tended to be used in tandem while other forms, such as "strikes, stop work meetings and bans" were also related. It appears that actions which do not stop production are used by employees in some workplaces while other workplaces experience production interrupting action. Six distinct groups with different patterns of industrial action were found. Approximately 10 percent of the workplaces were active. One group (4), was extremely active in strikes and pickets while another group (5) was also active but tended to use bans, go slows and work to rule more than group 4.

An analysis of the background data suggested that groups 4 and 5 workplaces had the largest number of employees, more unions, significant union activity and the lowest percentage of females. Further, the "highly active" workplaces were more likely to employ full-timers and core workers. It is clear that different workplaces experience quite different patterns of industrial activity and that these differences are due to a number of workplace characteristics, especially workplace size and union importance. What is also clear is that organisations which grow are likely to experience increasing industrial activity unless appropriate workplace reforms prevent a movement to a "large organisation" philosophy among management and workers.

Finally, it should be noted that absenteeism, voluntary labour turnover and labour productivity were unrelated to industrial action patterns.

## REFERENCES

- Callus, R., Morehead, A., Cully, M. and Buchanan, J., (1991), *Industrial Relations at Work*, Commonwealth Department of Industrial Relations, Australian Government Publishing Services, Canberra.
- Clark, R., (1992), *Australian Human Resources Management: Framework and Practice (2nd edition)*, McGraw Hill, Sydney.
- Freeman, R. and Medoff, J., (1984), *What Do Unions Do?*, Basic Books, New York.
- Franke, G.R., (1985), "Evaluating Measures Through Data Quantification: Applying Dual Scaling to an Advertising Copytest", *Journal of Business Research*, Vol.13, 61-69.
- Green, P.E., Scaffer, C.M. and Patterson, K.M., (1988), "A Reduced Space Approach to the Clustering of Categorical Data in Market Segmentation", *Journal of the Market Research Society*, Vol.30, No.3, 267-290.
- Greenacre, M.J., (1984), *Theory and Applications of Correspondence Analysis*, Academic Press, London.
- Greenacre, M.J., (1989), "Measuring Total Variation and its Components in Multiple Correspondence Analysis", Paper presented at the International Data Analysis Conference, Antibes, France.
- Hammer, W.C., and Smith, E.J., (1978), "Work Attitudes as Predictors of Unionization Activity", *Journal of Applied Psychology*, Vol.63, 415-421.
- Hoffman, D.L. and Franke, G.R., (1986), "Correspondence Analysis: Graphical Representation of Categorical Data in Market Research", *Journal of Marketing Research*, Vol.23, 213-227.
- Howard, H. and Harris, R.D., (1966), "A Hierarchical Grouping Routine; IBM 360/65 FORTRAN IV Program", University of Pennsylvania Computing Center, Philadelphia.
- Johnson, R.M., (1977), "Multiple Discriminant Analysis: Marketing Research Applications", in Sheth, J.N., (ed.), *Multivariate Methods for Market and Survey Research*, AMA, Chicago, 65-82.
- Klecka, W.R., (1980), *Discriminant Analysis*, Sga Publications, Beverley Hills, California.
- Knight, K.G., (1989), "Labour Productivity and Strike Activity in British Manufacturing Industries: Some Quantitative Evidence", *British Journal of Industrial Relations*, Vol.27, No.3, 365-374.
- Lebart, L., Morineau, A. and Warwick, K., (1984), *Multivariate Descriptive Analysis*, Wiley, New York.

- McHugh, R., (1991), "Productivity Effects of Strikes in Struck and Unstruck Industries", *Industrial and Labor Relations Review*, Vol.44, No.4, 722-732.
- McShane, S.L., (1984), "Job Satisfaction and Absenteeism: A Meta-Analysis Re-examination", *Canadian Journal of Administration Science*, Vol.1, 61-77.
- Milligan, G.W. and Mahajan, V., (1980), "A Note on Procedures for Testing the Quality of a Clustering of a Set of Objects", *Decision Sciences*, 669-677.
- Peterson, R.A. and Mahajan, V., (1976), "Practical significance and partitioning variance in discriminant analysis", *Decision Sciences*, 649-658.
- Savery, L.K., and Soutar, G.N., (1992), "Small Workplaces: the AWIRS Findings", in *Exploring Industrial Relations Further Analysis of AWIRS*, Industrial Relations Series, No.4, November, The Department of Industrial Relations, Canberra, 113-158.
- Soutar, G.N., Savery, L.K. and Bickley, M., (1988), "Sexual Harassment in an Australian tertiary institution", *Western Australian Labour Market Research Centre Discussion Paper*, No.88/1.
- Soutar, G.N. and Clarke, Y., (1981), "Life style and television viewing behaviour in Perth, Western Australia", *Australian Journal of Management*, June, 109-123.
- SSDA, (1991), *Australian Workplace Industrial Relations Survey (AWIRS) 1989-1990: Technical Report and Data Release*, Social Science Data Archives, The Australian National University, Canberra, (SSDA Study No.600).
- Stagner, R. and Rosen, H., (1965), *The Psychology of Union-Management Relations*, Tavistock, London.
- Staw, B.M. and Oldam, G.R., (1978), "Reconsidering Our Dependent Variables: A Critique and Empirical Study", *Academy of Management Journal*, Vol.21, No.4, 539-559
- Trade Union Training Authority, nd, *Unions in Accord: A package for the future*, Trade Union Training Authority, Melbourne.
- Zappala, J. (1988), *Workplace Industrial Relations in Australia: An Annotated Bibliography 1979-1987*, University of Sydney, (CIRRUS) and BCA.

# The Impact Of Unions On Workplace Productivity And Profitability In Australian Workplaces\*

Geoffrey Crockett, Peter Dawkins &  
Charles Mulvey

Trade unions are an important feature of the Australian economy. They appear to be able to affect a number of variables, including relative wages, the incidence of fringe benefits and labour turnover [see, for example, Christie (1991), Miller and Mulvey (1991, 1992), Drago and Wooden (1991)]. They are also held to have a major influence on the economy through restrictive work practices [Business Council of Australia (1986)].

The consequences of trade union activity for labour turnover, job duration and layoffs have been the subject of a number of recent papers [eg., Miller and Mulvey(1991), Drago and Wooden (1991)]. With the completion of the Australian Workplace Industrial Relations Survey (AWIRS) it is now possible to complement the earlier studies by undertaking an empirical investigation of the direct link between unions and productivity in Australia. This evidence will provide a firm basis for comparison with the extensive literature on the impact of trade unions on productivity that has developed in the US and Britain following the publication of Freeman and Medoff's (1984) book entitled "What Do Unions Do?".

\* Paul Miller, University of Western Australia and the Western Australian Labour Market Research Centre, was a co-author on an initial paper on workplace productivity [Crockett, Dawkins, Miller, and Mulvey, (1992)]. The data set on which this paper is based is from the Australian Workplace Industrial Relations Survey. The data has been provided by the Commonwealth Department of Industrial Relations.

We are grateful for comments received on earlier drafts from participants of seminars held by The W.A. Labour Market Research Centre, the School of Economics and Finance, Curtin University, the School of Economics and Finance, Royal Melbourne Institute of Technology, and the Conference on Quantitative Approaches to Economics and Labour Relations, Sydney 1992, and the 1991 Conference of Economists, University of Tasmania. We are also grateful for comments from Kim Sawyer, Mark Wooden and Michael Kidd.

With a positive effect on wages and a negative effect on productivity, it might be expected that unions have a negative effect on the profitability of firms and workplaces. It was something of a surprise, therefore, when the first study of this in Australia, [Drago and Wooden (1992)] failed to find such an effect on the rate of return on capital in Australian workplaces. In this paper, we extend our work on productivity effects to the effects on the rate of return on capital.

## OVERVIEW OF THE LITERATURE

### Unions and Productivity and the 'Two Faces of Unions'

Freeman and Medoff's (1984) exit/voice model of the effects of unions is an adaptation of a more general model proposed by Hirschman (1971). In this model dissatisfied labour has two avenues of response: it can exit the firm or voice its concerns. Freeman and Medoff argue that non-union labour will typically use exit rather than voice. Because a union is a collective organisation, the predominant response of unionised workers, however, will tend to be voice.

The reduction in quit rates as the result of the presence of unions is expected to enhance productivity. Furthermore, it is argued that unionism opens up communication channels between workers and their managers - through collective bargaining, grievance and disputes procedures etc. - which provide for orderly industrial relations and for information flows which modify the behaviour of all parties [Freeman and Medoff (1984) p.12]. The other face of unionism, 'the monopoly face', derives from the market power of unions, and the use of that power to increase wages higher than they would otherwise be, and/or to have a detrimental effect on workplace and firm performance.

Metcalf (1990) suggests there are four routes through which unions can lower productivity, namely:

- (i) restrictive workplace practices,
- (ii) industrial action,
- (iii) reduced investment,
- (iv) an adversarial style of industrial relations, producing low trust and lack of cooperation between the parties.

The five channels by which unions can boost labour productivity identified by Metcalf are:

- (i) relative wage effects which may induce capital/labour substitution,
- (ii) provision of a monitoring role on behalf of the employer,
- (iii) the familiar collective voice arguments,
- (iv) making management less lethargic,

- (v) prevention of the exploitation of labour.

Metcalf argues that whether unions raise or lower productivity is an empirical question. A number of US studies are reviewed in Freeman and Medoff (1984, Table 11-1, p.166) and Hirsch and Addison (1986, Table 7.1, pp. 916-7). There are two main findings. First, the evidence is fairly strongly in favour of a generally positive union impact on productivity. Second, the range of estimates is, unfortunately, disconcerting; from about -20 percent to +40 percent in the studies reviewed in Freeman and Medoff (1984) and Hirsch and Addison (1986). More recently, Blanchflower and Freeman (1990, p.16) have suggested that 'The preponderance of US studies do indicate a positive union productivity effect but there are enough counter-examples to suggest that it is the state of labour relations rather than unionism and collective bargaining per se that determines productivity'.

Controversy also surrounds the UK studies of the union impact on productivity.<sup>1</sup> Twelve British studies that attempt to estimate the impact of unionism on productivity *levels* in the UK and seven relating unionism to productivity *growth* are summarised in Metcalf (1990, pp. 259-65). Union presence is proxied by the level of strike activity in two studies [Caves (1980) and Davies and Caves (1987)] and by union recognition in another [Machin and Wadhvani (1989)].

There is a considerable dispersion in the estimated union effects across the studies, though generally there is a negative association between unionism and labour productivity. This contrasts to the pattern of effects reported for the US labour market. However, the relationship between unionism and labour productivity is apparently quite complex. For example, the effect of unions on productivity appears to vary with union density [see Wilson (1989), and Edwards (1987)].

## Unions and Profitability

The impact of unions on profitability is usually thought of as the net result of two other separate processes. While it is generally accepted that unions raise wages above the rates paid to non-union workers, *ceteris paribus*, by means of their monopoly power, unions may have the effect of raising productivity through their collective voice activities. Most US studies have found that unions raise productivity. Other US studies, and almost all British studies, find that unions reduce productivity. Where unions raise wages and increase productivity,

<sup>1</sup> The matters at issue in the controversy are well illustrated by reading Nolan and Marginson's (1990) critique of Metcalf's reply, Metcalf (1990). At one level the debate, as with that in the US literature, simply concerns the appropriate interpretation of the results of the various empirical studies, at another it relates to the capacity of neoclassical economics to provide an adequate theoretical framework for the analysis of the impact of unionism. In relation to the latter point, the critics of the neoclassical model (Nolan and Marginson in this case) argue that a dynamic perspective which stresses the role of the power relationships between the parties is required to properly evaluate the role of unionism and that the assumption that '... the employment relationship would be characterised by shared interests, harmony and co-operation in the absence of unions' [Nolan and Marginson (1990) p 230] is incorrect and misleading. Metcalf (1990) responds with a spirited defence of his review indicating that the studies do not rely on a neoclassical underpinning.

therefore, the net effect on profitability will depend on the relative magnitudes of the two effects.

The above analysis is correct where profitability is defined as total profits but, as Clark (1984) has shown, the matter is more complicated where profitability is measured by the rate of return on capital. Clark (1984) has analysed the relationship between union-induced changes in wages and productivity on the rate of profit. Clark's analysis shows that it is not possible to compute the effects of unionism on the rate of return simply by calculating the net effect of relative union wages and relative union productivity. Hence, it does not necessarily follow that if unions raise wages by proportionately more than they increase productivity that the rate of return to capital will fall or vice versa. This is because union-induced changes in wages may also induce changes in the capital/labour ratio, may result in a bargain which is off the labour demand curve and will vary in their impact according to the market structure concerned.

The magnitude of the effect of changes in the capital/labour ratio depends on scale and substitution effects and the rule is that, holding productivity constant, the rate of return on capital will fall in response to an increase in the union wage where the elasticity of substitution is greater than unity and rise where it is less than unity.

In this monopoly model, union productivity effects on their own, do not affect the rate of return on capital. There are offsetting effects on total profits and on the stock of capital. The effect of unions on profitability, therefore depends on their wage effects which in turn are dependent on the elasticity of substitution.

Further complications arise when one considers the possibility that the wage setting process may involve wage/employment solutions which are off the firm's demand curve for labour. [Efficient bargains are an example. See Clark (1984).] In this case it is very difficult to specify what the effect of a given union-induced change in wages or productivity will be on the rate of return since union objectives and the distribution of relative bargaining power will be important mediating influences.

While no general predictions concerning the effects of union-induced wage and productivity changes under off-the-demand schedule bargains are possible, it is only under very restrictive assumptions that a wage increase would not tend to reduce the rate of return. The effects of productivity changes, however, are ambiguous. According to Clark (1984) the net effect of a positive wage effect and an offsetting productivity effect is likely to be negative.

Clark (1984) argues that market structure, too, may influence the impact of the union. In an oligopolistic market environment the union, through its wage effect, will have least impact on the rate of return of those firms which possess market power and most impact on the rate of return of those firms which face a competitive situation. Where union wage and/or productivity effects are themselves related to market structure, the conclusions above are not altered. Where firms have market power, their profits are likely to be relatively high. High profits simultaneously serve as a target for union wage bargainers and also as an assurance that the firm will survive a relatively large wage concession to the union. However, market power endows the firm with a greater capacity to resist union wage demands because of its ability to withstand strike action. Since the two effects noted above operate in different directions it is not possible to predict, on

theoretical grounds, whether or not unions will make greater wage gains in firms with market power relative to those in competitive market environments.

From Clark (1984) above, we can have no clear prior expectations as to the net impact of Australian unions on the rate of return. The outcome depends on the mediating influences of the elasticity of substitution, whether or not bargains are struck on the labour demand curve and the market structure of the cases under analysis. The only previous Australian study of unions and profitability, Drago and Wooden (1992), found no significant effects but did not take into account these mediating influences.

A number of studies of the relationship between unionism and profitability have been carried out in both the UK and US. [See Mulvey (1992).] Both for the US and UK almost all studies find that unionism reduces profitability [Freeman (1984), Clark (1984), Belman (1989), Hirsch (1991), Machin (1988), Machin and Stewart (1988) and Blanchflower and Oswald (1988)].

## THE AWIRS DATABASE, DEPENDENT & INDEPENDENT VARIABLES

### Introduction

The Australian Workplace Industrial Relations Survey (AWIRS) [Callus, Morehead, Culley and Buchanan (1991)] collected data about the presence of unions, the percentage of workers in each broad occupational group unionised, and the number of unions present. Each of these dimensions of trade union influence is utilised in the econometric analyses presented below.

The paper proceeds as follows. Firstly we review the dependant and explanatory variables for the models estimated explaining relative workplace productivity; this is followed by a discussion of the fitted models. The productivity models are then extended to include additional explanatory variables for the profitability models.

### Data on Productivity

In the General Management Questionnaire in the AWIRS, respondents were asked to place on a five point scale the level of the productivity of their workplace compared with other workplaces in their industry. The scale ranged from 'a lot lower' to 'a lot higher'. While the question solicits subjective information; only those establishments which had already confirmed that they measured productivity were asked to indicate their relative productivity standing. This encourages us to have confidence in the reliability of the data.<sup>2</sup> Since the vast majority of respondents to this question on relative productivity are from the private sector, we confine our analysis to the private sector workplaces in the sample.

<sup>2</sup>

It should be noted that the questions on whether and how firms measure productivity immediately precede that on perceived relative productivity. In subsequent surveys, it may be appropriate to attempt to build some checks into the questionnaire that would enable the accuracy of management's responses to be assessed.

## Other Variables for the Productivity Models

For the purposes of this paper we divide the control variables into seven categories:

### *(i) Capital intensity and capacity utilisation*

Neo-classical production function analysis predicts that the higher the capital intensity of the workplace, the higher will be its labour productivity. There are also reasons why labour productivity could be related to capacity utilisation, although the net direction of impact is unclear. The closer the workplace is to capacity utilisation, the less likely it is that the workplace will be characterised by labour hoarding, a factor that should increase the productivity of labour. Alternatively, the closer the workplace is to capacity utilisation the greater the possible problem of using inferior capital and/or bottlenecks occurring in the production process. In this study labour's share of total cost is used as an inverse measure of capital intensity.

### *(ii) Earnings variables*

There is a growing body of literature that canvasses the possibility that both the payments system and level of pay can have incentive effects that affect labour productivity [Efficiency wage theory, for example]. Alternatively, a payments system that attempts to reward effort directly (performance related pay) or a profit sharing scheme could increase labour productivity. Variables for whether the earnings of the workforce were above average, or below average, and for the percentage of non-managerial employees receiving performance related pay and the percentage of non-managerial employees receiving pay from a profit sharing scheme are included in the estimating equation.

### *(iii) Workplace size*

The literature on the firm/establishment size wage effect has offered a number of reasons why large firms pay higher wages than small firms [see Brown and Medoff (1989)]. A link can then be established between workplace size and productivity<sup>3</sup>.

### *(iv) Employee involvement in decision making*

There is a growing body of literature that suggests that favourable productivity effects will flow from involving employees in the decision-making process. The factors that are viewed as important are the degree of communication in the workplace, whether workers have a seat on the board of management, and whether productivity groups or quality circles have been established.

<sup>3</sup>

An establishment size variable may proxy other aspects of the structure of an establishment, including economies of scale and the greater capital intensity of larger establishments that may be captured by the crude labour costs variable noted above.

**(v) Workforce composition and labour turnover**

Human capital theory suggests that the higher the skill composition of the workforce, the higher the average labour productivity. The AWIRS does not contain information on educational attainment. However, the skill composition can be proxied by such variables as the percentage of the workforce who are professionals and the percentage of the workforce who are tradespersons.

A negative relationship is expected between labour turnover and labour productivity. If firm-specific skills obtained through on-the-job-training and experience are important then high labour turnover could be expected to reduce labour productivity.

**(vi) Product market characteristics**

The degree of product market competition is expected to influence a firm's productivity. However, since the analysis is based on a measure of relative productivity within an industry there is no obvious reason why a variable measuring the degree of product market competition should be included. Our reported results, therefore, do not include this variable.<sup>4</sup>

Evidence shows that labour productivity behaves pro-cyclically, suggesting a positive relationship between labour productivity and expanding product demand. For this reason dummy variables for 'demand expanding' and 'demand contracting' are included.

**(vii) Industry dummies**

Industry dummies were included in preliminary analyses to capture any inter-industry fixed effects on productivity. There is no obvious reason, however, why the industry that a workplace is in should affect its productivity relative to other workplaces in the same industry, and this hypothesis was confirmed by the results.

## RESEARCH QUESTIONS AND RESULTS ON RELATIVE PRODUCTIVITY LEVELS

### Research Questions

The principal research questions that we wish to address are:-

- (i) Does union density have an effect (positive or negative) on workplace productivity in Australia?
- (i) Does the presence of unions have an effect (positive or negative) on workplace productivity in Australia?

<sup>4</sup> As a check we did include a measure of product market competition in an equation that we have not reported. It was found to be insignificant.

- (iii) Does the number of unions have a negative effect on workplace productivity in Australia?

As implied by the way we have expressed the questions, we do not have any *a priori* expectations about the effect of union presence or union density on workplace productivity. As far as the number of unions is concerned, however, we have an expectation that the greater the number of unions the lower the level of labour productivity. The negative impact arises in this instance from the industrial relations/communications problems created by multi-unionism. The discussion in the previous section suggests that a number of variables will be associated with higher relative productivity, including performance-related pay schemes, profit sharing schemes, above average earnings, a high capital to labour ratio, a highly skilled workforce and conditions of expanding demand for the product produced. Variables that may be associated with lower productivity include workplace size, below average earnings and a contracting demand for the product. It is not possible to provide an unambiguous prediction of the impact of some variables that are included in the estimating equations. For example, the measures of capacity utilisation and labour turnover could be associated with either higher or lower relative productivity. Details on the method of construction of variables included in the equations are presented in a data appendix.

## ESTIMATION METHOD AND RESULTS FOR THE PRODUCTIVITY MODELS

Table 1 lists the percentage distribution across the relative productivity categories of the 759 private sector workplaces included in the sample.<sup>5</sup> It is noted that very few workplaces perceive their productivity to be 'a lot lower' than that of other workplaces in their industry, and that a greater percentage of the workplaces reported that their relative productivity was above average than the percentage that reported that their productivity was below average. The categorical responses listed in Table 1 provide our dependent variable.<sup>6</sup>

### The Estimation Method for the Productivity Models

Weights are supplied in the AWIRS to compensate for differences in the probability of selection across size of establishment. In general, the models produced by weighting the data by workplace size provided better estimates than those using unweighted data; hence the workplace weights are applied to all estimations.

---

<sup>5</sup> The majority of respondents to the questions about productivity and profitability were in the private sector. Confining the analysis to the private sector also provides a more homogeneous sample with respect to their motivations and the expected influence of a wide range of variables.

<sup>6</sup> As the dependent variable relates to a subsample of workplaces we tested for possible selectivity bias. Thus, the relative labour productivity model was re-estimated including a sample selectivity term. The additional regressor was statistically insignificant, however, implying the absence of sample selectivity bias. This is consistent with the findings of Drago and Wooden (1992) from their independent analysis of these data.

**TABLE 1: LABOUR PRODUCTIVITY RELATIVE TO OTHER FIRMS IN THE INDUSTRY**

Response	Number	Frequency
A lot higher	85	0.112
A little higher	249	0.328
About the same	315	0.415
A bit lower	91	0.120
A lot lower	19	0.025
<b>TOTAL</b>	<b>759</b>	<b>1.000</b>

The model predicting membership in the five productivity categories is estimated using an ordered probit maximum likelihood estimation technique. This technique has been used previously in the study of union effects by Hirsch and Link (1987) and by Machin and Stewart (1988). The model provides estimates of the cutoff values (the  $\mu$ 's in Appendix Tables 1A and 2A - see Greene, p703, 1991, and Greene, p.525, 1992 for model details). In our exploratory analysis most attention will be placed on the signs and statistical significance of the coefficients. A positive coefficient is associated with a higher probability of membership of the highest ranked relative productivity category, and with a lower probability of membership of the lowest ranked relative productivity category. It is useful to compute predicted probabilities of membership of each of the five relative productivity categories using the equation set out in McKelvey and Zavoina (1975). Examples of these are presented and discussed later in the text. In the first instance, however, the discussion will focus on the ordered probit estimates listed in Table 1A.

While the equations listed in Table 1A are statistically significant overall, few variables are individually significant.<sup>7</sup> This may be attributable to the nature of the dependent variable, which is defined as productivity relative to other firms in the same industry.

The statistical significance of individual regressors does not differ appreciably across specifications and methods of estimation (weighted or unweighted data).<sup>8</sup> The variables that are significant determinants of a firm's relative productivity are (i) whether earnings are above average, (ii) the percentage of the workplace employed in the professional occupational category, (iii) unionism, and (iv) the variables for employee involvement in decision making. The higher the relative earnings of the workplace the more likely it is that the workplace will be represented in the highest relative labour productivity category. This could reflect

<sup>7</sup> We note that application of the test for heteroscedasticity outlined in Machin and Stewart (1988) leads to a rejection of the null hypothesis that the errors are homoscedastic in the specifications listed in Table 2. Heteroscedasticity in the context of an ordered probit model has implications for both statistical inference and the consistency of the estimators. Re-estimation of the equations using various weighting schemes did not overcome the problem. The nature of this heteroscedasticity (for example, is it due to the mingling of absolute and relative variables?) and the general poor performance of the models are areas that require detailed investigation before too much importance is attached to findings derived from the AWIRS data.

<sup>8</sup> Tables 2 and 5 show only weighted data. For the estimates using unweighted data, see Crockett, Dawkins, Miller and Mulvey (1992).

an 'efficiency wage' effect, with higher relative earnings inducing higher labour effort. Alternatively, the higher labour productivity is, the higher the earnings that are paid, which is entirely consistent with traditional marginal productivity theory. Workplaces that employ a higher percentage of professionals have higher productivity. As professional occupations are highly skilled, this evidence is consistent with a human capital interpretation of workplace behaviour.

We have a number of different measures of the presence and behaviour of trade unions. As these variables are essentially measuring the same phenomenon of union power, it is not surprising that when they are all included in the same equation each is insignificant. When entering the variables separately, the presence of trade unions, union density and the variable measuring the number of unions present are negative, and statistically significant. The general conclusion is that trade unions are associated with lower relative productivity in the Australian labour market. Restrictive workplace practices of unions [see Business Council of Australia (1986)] may be the reason for this effect. The negative union effect is strongest when unionism is measured by the 'number of unions' variable, possibly because of demarcation problems, inter-union competition, and communication problems.

The estimated effects are, as illustrated in Tables 2 and 3, reasonably small. Table 2 lists the predicted distribution of workplaces across the five relative productivity categories by union density. At zero density, the probability of a workplace being in the highest relative productivity category is 13 percent, and this declines monotonically to 9 percent at 100 percent unionisation. At the same time, the Table indicates that as union density increases, the predicted membership of categories one, two and three increases, and that of category 4 declines.

Table 3 presents the predicted distribution of workplaces across the five relative probability categories by number of unions. Increases in the number of unions at the workplace are associated with increases in the membership of the three lowest productivity categories and reductions in the membership of the two highest categories. However, the effect of a change from zero to four unions on the membership of any of the productivity categories, does not exceed four percentage points.

The impact of employee involvement in decision making is sensitive to the level of involvement. There is some evidence that low level communications, such as regular meetings between senior managers and employees, are detrimental to productivity. High level communications, such as on-going joint consultative committees, also tend to reduce relative productivity. However, where quality circles or productivity improvement groups are a feature of the workplace, or where employees have formal representation on the board of management, then productivity is improved. Hence, these results establish a link between worker participation in activities specifically designed to improve productivity and relative productivity.

**TABLE 2: PREDICTED MEMBERSHIP OF RELATIVE PRODUCTIVITY CATEGORIES BY UNION DENSITY**

Union Density	A lot lower	A bit lower	About the same	A little higher	A lot higher
0.0	0.016	0.096	0.402	0.360	0.125
10.0	0.017	0.100	0.406	0.356	0.121
20.0	0.018	0.103	0.410	0.352	0.117
30.0	0.019	0.106	0.414	0.348	0.113
40.0	0.020	0.110	0.418	0.343	0.109
50.0	0.021	0.113	0.422	0.339	0.105
60.0	0.022	0.117	0.426	0.334	0.101
70.0	0.023	0.120	0.429	0.330	0.098
80.0	0.025	0.124	0.433	0.326	0.094
90.0	0.026	0.127	0.436	0.321	0.091
100.0	0.027	0.131	0.439	0.316	0.087

**TABLE 3: PREDICTED MEMBERSHIP OF RELATIVE PRODUCTIVITY CATEGORIES BY NUMBER OF UNIONS**

Number of Unions	A lot lower	A bit lower	About the same	A little higher	A lot higher
0 0.124	0.016	0.097	0.403	0.360	
1 0.115	0.018	0.104	0.413	0.350	
2 0.106	0.020	0.112	0.421	0.341	
3 0.098	0.023	0.120	0.430	0.331	
4 0.090	0.025	0.128	0.437	0.320	

To test the union voice hypothesis that unions enhance employee involvement, we have included interaction terms between the variable for union presence and the employee involvement variables. The results are reported in Appendix Table 2A.

The coefficients on the employee involvement variables and the interactive terms should be read together. The results (using the weighted data) suggest that low level communications do have a negative effect on productivity, but only where

unions exist. This effect is significant at the ten percent level. Stronger evidence exists about the effect of quality circles. Using both the weighted and the unweighted data, the results indicate that quality circles have a positive and highly significant effect on relative productivity, but the presence of unions strongly negates and more or less eradicates this effect. That is to say that quality circles only seem to have a positive effect on productivity where unions are not present.

We appear, therefore, to have found evidence of positive effects on productivity of employee involvement which do not appear to be enhanced, and in some ways are strongly hindered, by the presence of unions. On the face of it, this would appear to cast some doubt on the union voice hypothesis.

### Unions and Workplace Profitability

The first of two profitability models is estimated using the same variables that were used previously in the study of the impact of unions on productivity, adding measures of the competitiveness of the industry and adding industry dummies to test for systematic differences in workplace profitability between industries. In the second profitability model, we attempt to test the hypotheses, following from Clark (1984), that:-

(i) the impact of unions on profitability is likely to depend on the degree of product market power of the firms in question, and to be least in firms with greater market power. We do this by separating the sample into two. One is for workplaces with many competitors, and the other for workplaces with few or no competitors.

and

(ii) the existence of "off-the-demand curve bargaining" will have an influence on the effect of unions on the rate of return on capital. We do this by introducing an extra variable into model 2 which is an attempt to proxy the existence of "off-the-demand curve" bargaining. Although Clark (1984) highlighted this effect in his theoretical section, his empirical work did not attempt to take this into account.

### Data on Profitability

General Managers were asked to supply the rate of return in the last financial year for the workplace, using the 5-point rating scale shown in Table 4:

**TABLE 4: RATE OF RETURN TO CAPITAL**

Response	Code	Number	Frequency
Less than zero%	0	73	0.1177
Zero - 5%	1	154	0.2484
6 - 10%	2	145	0.2339
11 - 15%	3	90	90.00
More than 15%	4	158	0.2548
<b>TOTAL</b>		<b>620</b>	<b>1.000</b>

For the purposes of the model to be fitted, the responses were coded from zero for the lowest rate of return category to 4 for the highest return category.

## THE ESTIMATION METHOD AND RESULTS OF THE PROFITABILITY MODELS

### The Estimation Method for the Profitability Models

The nature of the dependent variable suggests an ordered probit model, where the probability of the respondent choosing one of these five responses is hypothesised to be a function of various characteristics of the workplace suggested by the relevant theory. However, in this case we have the cutoff values (0,5,10 and 15%), and can make use of this information by using a censored data regression model (for estimation details, see Greene, p.738, 1991, and Greene, p.573, 1992).

The independent variables in the first profitability model are largely drawn from those used as variables that are expected to influence workplace productivity. This is based on the idea that factors increasing productivity will also increase profits, *ceteris paribus*.

In summary, a number of the variables are expected to have a positive effect on productivity and hence on profitability, including performance related pay schemes, profit sharing schemes, employee involvement, above average earnings, a high capital to labour ratio, a highly skilled workforce and conditions of expanding demand for the product. It is not possible to provide an unambiguous prediction of the impact of some variables, including, for example, the measures of capacity utilisation and labour turnover.

In addition to these variables we also include measures of the competitiveness of the product market and industry dummies. We would normally expect higher rates of return in more monopolised markets (reflecting monopoly profits) and the possibility of systematic industry effects. Again, a description of the construction of these variables can be found in the data appendix.

The results of our estimates of the first profitability model are included in Appendix Table 3A, equations 1,2, and 3.

The main point to make about the results in Table 3A, is that no significant effects are found, of unions, on the rate of return on capital. This is consistent with the findings of Drago and Wooden (1992).

While these results may at first seem surprising, they are not inconsistent with theoretical predictions. This is because the union effects on profitability are, in theory, contingent on the elasticity of substitution of capital for labour, the market structure, and whether there is off-the-demand curve bargaining. We do not have any controls for these variables, and thus the insignificance of the union variables could be regarded as quite unsurprising.

As for the other variables, the signs of the significant effects appear, in general, to be highly plausible. The rate of return is higher, the closer the workplace is to full capacity. It is lower the greater the number of competitors and the greater the

intensity of competition. There is a positive association between the rate of return and above average earnings. This may reflect reverse causation or possibly efficiency wage effects. There is a positive association between the rate of return and the presence of profit sharing schemes. Again this could reflect reverse causation or incentive effects.

In our second profitability model, we partition the sample into those where the workplaces face many competitors on the one hand, and those where the workplace faces few competitors, on the other hand. We also noted earlier, that Clarke (1984) concluded that the impact of unions on profitability could be contingent on whether the wage-employment outcomes are on the demand curve ("monopoly union model" or "right to manage model"), as opposed to being set by "efficient bargaining" or "off-the demand-curve bargaining". This is a very hard distinction to tie down empirically, and Clark (1984) did not do so in his empirical work.

In seeking a proxy for "off-the-demand-curve bargaining", we have been guided by Clark's discussion of the nature of "off-the-demand-curve" or "on-the-contract-curve" bargaining:

"The assumption that the agreement lies on the contract curve implies that bargaining extends beyond wage rates to include, perhaps implicitly, the level of employment, and other aspects of production. A variety of instruments are available that effectively constrain production adjustments by the firm without involving an explicit agreement on the number of workers, or the total hours of work. Work rules and provisions covering new technology can be interpreted as measures to achieve a bargain off-the-demand-curve." (Clark 1984, p.897).

With this in mind, we used a question from the AWIRS survey on whether unions constrained management in their desire to make a significant workplace change. Where the answer was yes, this is taken to be a proxy for off-the-demand-curve bargaining. It is necessarily a crude proxy, but we consider, an advance on previous research.

Some results from estimating this model are reported in Appendix Table 4A, (equations 4 and 5). We confine our reporting of results to the case where the presence of a union is captured by a simple dummy. Equation 4 is for that part of the sample of workplaces that have many competitors. Equation 5 is for those with few or no competitors.

The first and most striking result to be found in Table 4A is support for the hypothesis that the impact of unions on profitability from any given effect on costs (either through wages or productivity) is greater where product markets are more competitive. In equation 4 (with many competitors), the presence of a union is found to have a negative effect, significant at the five per cent level, on the rate of return on capital. The effect of unions in workplaces with few or no competitors is found to be positive but highly insignificant.

This contrast in the union effect between workplaces in competitive and non-competitive environments is more striking than that found by Clark (1984) in his US. study. In that study the effect was negative in both sub-samples but with the larger coefficient in the firms facing greater competition. However, that higher

coefficient was statistically insignificant, while the lower negative coefficient for the firms facing less competition was statistically significant.

Table 5 provides an idea of how to interpret the size of the coefficient on "union present" in the workplaces facing many competitors. This shows the estimated effect of the presence of a union on the distribution of workplaces across profitability categories. For example, the presence of a union increases the probability that a workplace will be in the bottom rate of return category, by seven and one half per cent, and reduces the probability that it will be in the top category by close to six per cent.

**TABLE 5: PREDICTED MEMBERSHIP OF PROFITABILITY CATEGORY BY UNION PRESENCE**

Union presence	Low Profitability			High Profitability	
	0	1	2	3	4
Code					
Not present	.1404	.2107	.2720	.2206	.0980
Union present	.2133	.2473	.2642	.1772	.1464

Turning to our attempt to proxy "off-the-demand-curve bargaining" with our "union frustration" variable, it is interesting to note that this indeed turns out to be significantly positive in the sub-sample of workplaces in a competitive environment. Remember, the direction of influence was ambiguous. The interpretation here would be that "off-the-demand-curve bargaining" (relative to outcomes being on the demand curve) actually has a positive effect on the rate of return on capital, in an environment in which unions increase wages and reduce productivity. Indeed comparison of the coefficients on the "union present" and "union frustration" variable suggests that this positive effect of the "union-frustration" variable outweighs the negative effect of the "union present variable", suggesting a net positive effect under "off-the-demand-curve-bargaining". The negative overall effect of unions on the rate of return on capital, therefore applies to those cases where the outcomes are on the demand curve. Given that the union frustration variable is a crude proxy, we cannot rule out the possibility, of course, that there is an alternative interpretation of this effect.

As far as the other variables are concerned, their significance and direction of influence are, in general, quite similar to those found in our first profitability model

## CONCLUSIONS

### Impact of Unions on Productivity

The literature reviewed suggests that trade unions are associated with higher productivity in the US, but with lower productivity in the UK. The analysis of the AWIRS presented in this paper places Australian trade unions alongside those in the UK: trade unions in Australia appear to be associated with lower relative productivity. This relationship is strongest when the effect of trade unionism is measured by the number of unions at the workplace, suggesting that amalgamation

of unions may enhance productivity. It is also shown that there is a link between worker participation in activities designed to improve productivity and workplace relative productivity. However, the presence of unions is found to militate against a great deal of the productivity enhancing benefits of employee involvement in decision-making.

### **Impact of Unions on Profitability**

With the Australian evidence suggesting that unions have a positive effect on wages and a negative effect on productivity, it is reasonable, therefore, to conclude that they have a negative effect on total profits. However, it is not possible to conclude from the evidence of their effect on wages and productivity, what their effect on the rate of return on capital will be.

Contrary to overseas research, this paper suggests that in a model which does not take into account any of these mediating factors, it is not possible to find empirical support for a negative effect of unions on the rate of return on capital. However, in a model which takes into account market structure and also attempts to take into account the presence of "off-the-demand-curve bargaining", significant union effects on the rate of return are found. In this model, the "union present" variable is found to have a significant negative effect on the rate of return on capital. Our proxy for "off-the-demand-curve bargaining" however, provides tentative evidence that where such bargaining takes place, there is a stronger positive effect on the rate of return on capital.

## APPENDIX

Appendix Table 1A: Estimates of Ordered Probit Model of Workplace Productivity I

Variable	Eq. (1) Union Density		Eq. (2) Union Present		Eq. (3) Number of Unions	
	Coeffic.	t-ratio	Coeffic.	t-ratio	Coeffic.	t-ratio
Constant	2.802	10.39**	2.790	10.59**	2.802	10.70**
Labour's share of total cost	0.001	0.42	0.001	0.43	-0.000	-0.13
Little below full capacity	-0.049	-0.60	-0.046	-0.57	-0.049	-0.60
Lot below full capacity	-0.027	-0.26	-0.041	-0.39	-0.028	-0.27
Earnings above average	0.321	4.29**	0.332	4.45**	0.329	4.40**
Earnings below average	0.036	0.28	0.037	0.29	0.035	0.28
Performance related pay	0.001	1.03	0.002	1.04	0.001	0.64
Profit-sharing scheme	0.007	1.52	0.007	1.50	0.007	1.40
Workplace size/100	-0.000	-0.01	-0.003	-0.07	0.002	0.07
% workplace professional	0.215	1.16	0.278	1.54	0.300	1.66#
% workplace tradesperson	0.041	0.23	0.067	0.37	0.105	0.58
Medium labour turnover	-0.064	-0.71	-0.072	-0.80	-0.059	-0.65
High labour turnover	-0.028	-0.33	-0.031	-0.37	-0.032	-0.39
Demand expanding	0.029	0.34	0.036	0.43	0.040	0.48
Demand contracting	-0.118	-0.98	-0.119	-0.99	-0.119	-0.99
Union present			-0.131	-1.69#	-	-
Union density	-0.002	-1.80#			-	-
Number of unions	-	-	-	-	-0.065	-2.39*
Low level communications	-0.595	-3.73**	-0.586	-3.71**	-0.561	-3.57**
High level communications	-0.161	-1.65#	-0.161	-1.64#	-0.140	1.43
Quality circles	0.185	1.81#	0.184	1.78#	0.194	1.92#
Seat on the board	0.669	3.97**	0.700	4.17**	0.687	4.08**
Mu-1	1.105	8.09**	1.104	8.15**	1.106	8.11**
Mu-2	2.397	15.93**	2.394	16.04**	2.399	15.97**
Mu-3	3.548	22.43**	3.550	22.59**	3.557	22.44**
Chi-square		.115.17**		113.78**		118.84**
SAMPLE SIZE		759		759		759

't' statistics: \*\* significant at 1% level; \* significant at 5% level;  
# significant at 10% level, for two-tailed test.

Estimates are weighted using the GMQWT weighting variable for workplace size supplied with the AWIRS database

**Appendix Table 2A: Estimates of Ordered Probit Model of Workplace Productivity II**

Variable	Coeffic	t-ratio
Constant	2.288	4.90**
Labour's share of total cost	0.006	0.32
Little below full capacity	-0.080	0.92
Lot below full capacity	-0.054	0.48
Earnings above average	0.340	4.27**
Earnings below average	0.367	0.28
Performance related pay	0.001	0.99
Profit-sharing scheme	0.007	1.42
Workplace size/100	-0.003	-0.11
% workplace professional	0.273	1.42
% workplace tradeperson	0.001	0.00
Medium labour turnover	-0.119	-1.21
High labour turnover	-0.071	-0.79
Demand expanding	-0.005	-0.06
Demand contracting	-1.334	-1.03
Union present	0.644	1.36
Low level communications	0.009	0.02
High level communications	-1.165	-0.98
Quality circles	0.539	3.17**
Union present and low level communications	-0.760	-1.70#
Union present and high level communications	0.030	0.15
Union present and quality circle	-0.494	-2.15*
Union present and seat on the board	0.153	0.46
Mu-1-	1.136	7.93**
Mu-2-	2.432	15.56**
Mu-3.	3.618	21.83**
Chi-square		140.50**

SAMPLE SIZE 759

't' statistics: \*\* significant at 1% level; \* significant at 5% level;  
# significant at 10% level, for two-tailed test.

Estimates are weighted using the GMQWT weighting variable for workplace size supplied with the AWIRS database

**Appendix Table 3A: Estimates of Ordered Probit Model of Workplace Profitability**

Variable of X	Eq. (1) Union Present		Eq. (2) Union Density		Eq. (3) Number of Unions		Mean
	Coeffic.	t-ratio	Coeffic.	t-ratio	Coeffic.	t-ratio	
Constant	17.951	6.842**	16.932	6.507**	17.278	6.710**	
Labour's share of total cost	-0.879E-01	-4.509**	-0.909E-01	-4.630**	-0.888E-01	-4.548**	37.010
Little below full capacity	-1.945	-2.452*	-2.002	-2.510*	-1.910	-2.408*	0.530
Lot below full capacity	-5.106	-4.625**	-5.168	-4.593**	-5.074	-4.592**	0.170
Earnings above average	2.165	3.004**	2.262	3.105**	2.185	3.019**	0.450
Earnings below 0.707E-01 average	-0.581	-0.434	-0.875	-0.650	-0.715	-0.533	
Performance related pay	0.135E-01	0.982	0.122E-01	0.884	0.120E-01	0.871	13.027
Profit-sharing scheme	0.537E-01	2.415*	0.545E-01	2.441*	0.543E-01	2.440*	3.375
Workplace size/100	-0.560E-01	-0.621	-0.798E-01	-0.863	-0.619E-01	-0.664	1.124
% workplace 0.808E-01 professional	0.923	0.335	2.665	0.943	1.724	0.625	
% workplace tradesperson	-2.989	-1.443	-2.629	-1.258	-3.003	-1.447	0.134
Medium labour turnover	0.954	1.108	1.053	1.213	0.924	1.071	0.263
High labour turnover	0.721	0.915	0.839	1.056	0.749	0.947	0.356
Demand expanding	0.487	0.649	0.445	0.587	0.490	0.651	0.558
Demand contracting	-0.133	-0.108	-0.299	-0.242	-0.243	-0.198	0.107
Union present	-0.851	-1.059	-	-	-	-	0.724
Union density	-	-	0.104E-01	1.048	-	-	37.002
Number of unions	-	-	-	-	-0.347E-01	-0.160	1.699
Number of competitors	-1.515	-1.842#	-1.381	-1.676#	-1.391	-1.694#	0.585
Intensity of competition	-0.469	-1.918#	-0.511	-2.079*	-0.478	-1.954#	4.769
Low level communications	0.543	0.278	0.558	0.284	0.654	0.334	0.968
High level communications	-2.192	-2.346*	-2.282	-2.421*	-2.265	-2.420*	0.816
Quality circles	0.139	0.147	0.157	0.166	0.263	0.277	0.175
Seat on the 0.382E-01 board	-3.775	-2.026*	-3.470	-1.858#	-3.647	-1.957#	
Industry - 0.161E-01 Mining	-1.949	-0.734	-2.150	-0.804	-1.920	-0.720	
Industry - 0.899E-02 Electricity	-5.222	-1.477	-5.913	-1.661#	-5.322	-1.494	
Industry - 0.540E-01 Construction	0.158	0.095	-0.185	-0.110	0.617E-01	0.037	
Industry - Wholesale	-1.684	-1.793#	-1.398	-1.460	-1.594	-1.693#	0.259
Industry - 0.348E-01 Transport	3.397	1.731#	3.732	1.860#	3.190	1.630	
Industry - Finance	0.217	0.167	0.226	0.173	0.245	0.185	0.140
Industry - Pub. 0.273E-01 Admin/Comm.Serv	-1.935	-0.758	-2.567	-1.010	-2.432	-0.960	
Industry - Recn. 0.978E-01 Pers. Serv.	-0.234E-01	-0.018	0.511E-01	0.040	-0.507E-01	-0.039	
sigma	7.575	24.398**	7.598	24.250**	7.586	24.371**	
Cragg-Uhler R <sup>2</sup>	.166		.166		.166		
SAMPLE SIZE	620		617		619		

't' statistics: \*\* significant at 1% level; \* significant at 5% level; # significant at 10% level;

Appendix Table 4A: Estimates of Ordered Probit Model of Workplace Profitability Sample Split into 'Many Competitors' and 'Few or No Competitors'

Variable	SAMPLE SPLIT INTO 'MANY COMPETITORS' AND 'FEW OR NO COMPETITORS'					
	MANY COMPETITORS			FEW OR NO COMPETITORS		
	Eq. (1)			Eq. (2)		
	Coefficient	t-ratio	Coefficient	t-ratio	Mean of X	
Constant	23.113	6.284**	15.135	3.203**		
Labour's share of total cost	-0.561E-01	-2.065*	-0.870E-01	-3.411**	36.979	
Little below full capacity	-1.846	-1.744#	-1.880	-1.722#	0.51484	
Lot below full capacity	-5.217	-3.789**	-3.557	-2.158*	0.19603	
Earnings above average	2.414	2.626**	1.411	1.278	0.46233	
Earnings below average	2.237	1.219	-3.028	-1.680#	0.59636E-01	
Performance related pay	0.303E-01	1.799#	-0.538E-02	-0.235	16.549	
Profit-sharing scheme	0.264E-01	0.973	0.766E-01	1.963*	4.1650	
Workplace size/100	-0.789E-01	-0.620	0.109	0.805	1.0290	
% workplace professional	5.723	1.611	-4.348	-1.109	0.73251E-01	
% workplace tradesperson	-4.270	-1.615	0.585	0.191	0.14887	
Medium labour turnover	-0.465E-02	-0.004	2.093	1.682	0.25513	
High labour turnover	-1.118	-1.122	4.204	3.645**	0.34611	
Demand expanding	0.679	0.686	0.403	0.390	0.57436	
Demand contracting	0.719	0.462	-0.469	-0.251	0.12427	
Union present	-2.035	-2.003*	0.251	0.198	0.67660	
Intensity of competition	-2.011	-4.117**	-0.112	-0.430	5.3500	
Union frustrate	3.345	2.189*	0.139	0.081	0.10603	
Manag. change						
Low level communications	0.187	0.088	0.289E-01	0.007	0.95502	
High level communications	-1.864	-1.491	-2.589	-2.025*	0.83075	
Quality circles	-2.150	-1.616	2.408	1.969*	0.13987	
Seat on the board	4.493	1.432	-7.878	-3.387**	0.25844E-01	
Industry - Mining	-1.538	-0.387	-1.384	-0.438	0.11936E-01	
Industry - Electricity	-	-	-3.216	-1.437	0.21690E-01	
Industry - Construction	2.151	0.926	-5.796	-1.787#	0.59343E-01	
Industry - Wholesale	0.433	0.370	-3.017	-1.984*	0.35236	
Industry - Transport	4.286	1.422	2.098	0.888	0.23333E-01	
Industry - Finance	1.498	0.901	-0.415	-0.215	0.16100	
Industry - Pub. Admin/Comm.Serv	-4.768	-1.491	1.377	0.360	0.30975E-01	
Industry - Recn Pers. Serv.	0.768	0.468	0.906	0.474	0.11204	
sigma	7.184	18.465**	6.856	16.105**		
Cragg-Uhler R <sup>2</sup>	.245		.379			
SAMPLE SIZE	341		279			

't' statistics: \*\* significant at 1% level; \* significant at 5% level;  
# significant at 10% level;

## VARIABLE CONSTRUCTION AND DESCRIPTION

Variable	AWIRS Question	Description
Labour's share of total costs	GC1	Mid-points of ranges: 1=10%, 2=30%, 3= 50%, 4= 70%, 5 = 90%
Little below full capacity	GC2	Dummy variable = 1 if lot below full capacity; omitted category 'At full capacity'
Lot below full capacity		Dummy variable = 1 if lot below full capacity; omitted category 'At full capacity'
Earnings above average	EC20	Dummy variable = 1 if earnings a little or a lot below average; omitted category 'Earnings about average'
Earnings below average	EC20	Dummy variable = 1 if earnings a little or a lot below average; omitted category 'Earnings about average'
Performance related pay	EC3 & EC2	% in last year of non-managerial employees receiving any performance related pay; mid-points of ranges: (Missing) = 0%, 1 = 5%, 2 = 17.5%, 3 = 37.5%, 4 = 63%, 5 = 87.5%, 6 = 100%; interacted with EC2 (factor payment based on) - if EC2a = 1 or EC2b = 1 or EC2c = 1, variable = EC3; otherwise = 0
Profit sharing scheme	EC6	% in last year of non-managerial employees receiving any pay from a profit sharing scheme; mid points of ranges: (Missing) = 0%, 1 = 5%, 2 = 17.5%, 3 = 37.5%, 4 = 63%, 5 = 87.5%, 6 = 100%
Workplace size/100	GA1	Scaled number of employees in workplace
% workforce professional	Q3 from SCQ	% of total employees at workplace in professional category
% workforce tradespersons	Q3 from SCQ	% of total employees at workplace in tradespersons category
Medium labour turnover	N32	Dummy variable = 1 if medium labour turnover for industry type; omitted category 'low labour turnover'
High labour turnover	N32	Dummy variable = 1 if high labour turnover for industry type; omitted category 'low labour turnover'
Demand expanding	GB7	Dummy variable = 1 if demand for products expanding; omitted category 'demand is stable'
Demand contracting	GB7	Dummy variable = 1 if demand for products contracting; omitted category 'demand is stable'
Union density	N40	AWIRS derived variable; % of workplace unionised
Number of unions	EK1	Number of unions at the workplace
Number of competitors	GB4	Dummy variable = 1 if few competitors; omitted category 'few or no competitors'
Union present	G1	Dummy variable = 1 if unions present in workplace; omitted category 'no union present'
Intensity of competition	GB5	Intensity of competition: from 1 = 'low level of competition' to 5 = 'intense level of competition'

(continued) →

Variable	AWIRS Question	Description
Union frustrate Management change	GE14a & GE14b	Dummy variable = 1 if management wants a change but frustrated by the union; (if GE14a = 2 or GE14b = 2 then dummy = 1; = 0 otherwise)
Low level communications	EH1	Dummy variable = 1 if low level (if EH1a = 1 or EH1e = 5 or EH1h = 8 or EH1j = 10, then dummy = 1; otherwise = 0)
High level communications	EH1	Dummy variable = 1 if high level (if EH1b = 2 or EH1c = 3 or EH1f = 6 or EH1d = 4, then dummy = 1; otherwise = 0)
Quality circle	EH1	Dummy variable = 1 if quality circle present; (if EH1g = 7, then dummy = 1; otherwise = 0)
Seat on board	EH1	Dummy variable = 1 if employees representation on board; (if EH1i = 9 then dummy = 1; otherwise = 0)
Industry - Mining	GA2	Dummy variable = 1 if Mining industry; omitted category is manufacturing
Industry - Electricity	GA2	Dummy variable = 1 if Electricity, gas, water; omitted category is manufacturing
Industry - Construction	GA2	Dummy variable = 1 if Construction; omitted category is manufacturing
Industry - Wholesale	GA2	Dummy variable = 1 if Whole & retail trade; omitted category is manufacturing
Industry - Transport	GA2	Dummy variable = 1 if Transport & storage; omitted category is manufacturing
Industry - Communications	GA2	Dummy variable = 1 if Communications; omitted category is manufacturing
Industry - Finance	GA2	Dummy variable = 1 if Finance & business; omitted category is manufacturing
Industry - Pub. Admin/Commun. Service	GA2	Dummy variable = 1 if Pub. Admin/Commun. Ser; omitted category is manufacturing
Industry - Recn. & Pers. Service	GA2	Dummy variable = 1 if Recn, & Pers. Service; omitted category is manufacturing

## REFERENCES

- Addison, J. and Hirsch, B. (1989) 'Union Effects on Productivity, Profits and Growth: Has the Long Run Arrived?', *Journal of Labor Economics*, 7:1, pp. 72-105.
- Bean, C. and Symons, J. (1990) 'Ten Years of Mrs T', London School of Economics, Centre for Labour Economics, Discussion Paper 370.
- Belman, D. (1989), "Unions, the Quality of Labor Relations and Firm Performance", mimeo, *Economic Policy Institute*, Washington D.C.
- Blanchflower, D.G. and Freeman, R.B. (1990) 'Going Different Ways: Unionism in the US and Other Advanced OECD Countries', Discussion Paper No.5, Centre for Economic Performance, London School of Economics.
- Blanchflower, D. and Oswald, A. (1988), "Profit-Related Pay : Prose Discovered?", *Economic Journal*, September, 720-730.
- Brown, C. and Medoff, J. (1978) 'Trade Unions in the Production Process', *Journal of Political Economy*, 86:8, pp. 355-78.
- Brown, C. and Medoff, J. (1989) 'The Employer Size-Wage Effect', *Journal of Political Economy*, 97:5, pp. 1060-1090.
- Business Council of Australia, (1986) 'Restrictive Work Practices', submission to the Economic Planning Advisory Council, *Business Council of Australia*.
- Callus, R., Morehead, A., Cully, M. and Buchanan, J. (1991), *Industrial Relations at Work : the Australian Workplace Industrial Relations Survey*, Commonwealth Department of Industrial Relations, AGPS, Canberra.
- Caves, R. (1980) 'Productivity Differences Among Industries', in Caves, R. and Krause, L. (Eds), *Britain's Economic Performance*, Washington D.C., Brookings Institution.
- Christie, V. (1992), "Union Wage Effects and the Probability of Union Membership", *Economic Record* 68, 200, 43-56.
- Clark, K.G. (1984), "Unionisation and Firm Performance : The Impact on Profit, Growth and Productivity", *American Economic Review*, 74:5, 893-919.
- Crockett, G., Dawkins, P., Miller, P., and Mulvey, C. (1992), "The Impact of Unions on Workplace Productivity in Australia", *Australian Bulletin of Labour*, 18(2), June.
- Davies, S. and Caves, R. (1987) *Britain's Productivity Gap*, Cambridge, Cambridge University Press.
- Drago, R. and Wooden, M. (1991) 'Turnover Down Under: Trade Unions and Exit Behaviour in Australia', *The Journal of Industrial Relations*, 33:2, 234-248.

- Drago, R. and Wooden, M., (1992), "The Australian Workplace Industrial Relations Survey and Workplace Performance", *Australian Bulletin of Labour*, 18(2), June.
- Edwards, P. (1987) *Managing the Factory*, Oxford, Basil Blackwell.
- Freeman, R. and Medoff, J. (1979), "The Two Faces of Unionism", *Public Interest*, Fall, 57, 67-93.
- Freeman, R. and Medoff, J. (1984), *What Do Unions Do?*, Basic Books, New York.
- Greene, W.H. (1991), *Econometric Analysis*. Macmillan, New York.
- Greene, W.H. (1992), *Limdep Version 6.0*, Econometrics Software Inc. New York.
- Hirsch, B.T. and Addison, J.T. (1986) *The Economic Analysis of Unions*, Boston, Allen and Unwin.
- Hirsch, B.T. and Link, A.N. (1987) 'Unions, Productivity, and Productivity Growth', *Journal of Labor Research*, 8, pp. 323-332.
- Hirsch, B.T. (1991), "Union Coverage and Profitability among U.S. Firms", *Review of Economics and Statistics*, 73(1) 69-77.
- Hirschman, A.O. (1971), *Exit, Voice and Loyalty*, Cambridge University Press, Cambridge MA.
- Machin, S. (1988), "Unions and the Capture of Economic Rents : An Investigation using British Firm Level Data", mimeo, Department of Economics, University College, London.
- Machin, S. and Stewart, M. (1988) 'Unions and the Financial Performance of British Private Sector Establishments', University College London, Department of Economics Working Paper No. 88-23.
- Machin, S. and Wadhvani, S. (1989) 'The Effects of Unions on Organisational Change, Investment and Employment: Evidence from WIRS', London School of Economics, Centre for Labour Economics, Discussion Paper No. 355.
- McKelvey, R. and Zavoina, W. (1975) 'A Statistical Model for the Analysis of Ordinal Level Dependent Variables', *Journal of Mathematical Sociology*, 4, pp. 103-120.
- Metcalf, D. (1990) 'Union Presence and Labour Productivity in British Manufacturing Industry: A Reply to Nolan and Marginson', *British Journal of Industrial Relations*, 28:2, pp. 228-49.
- Miller, P. and Mulvey, C. (1991), "Australian Evidence on the Exit/Voice Model of the Labour Market", *Industrial and Labour Relations Review*, 45:1, 44-57.
- Miller, P. and Mulvey, C. (1992), "Trade Unions Collective Voice and Fringe Benefits", *Economic Record*, 68(201) June.

- Mulvey, C. (1986), "Wage Levels : Do Unions Make a Difference?", 202-216 in Niland, J., *Wage Fixation in Australia*, Sydney, Allen and Unwin.
- Mulvey, C. (1991), "Union and Non-Union Workplaces : Measuring the Impact of Unions", Commonwealth Department of Industrial Relations, Discussion Paper.
- Mulvey, C. (1992), "The Impact of Unions on Economic Welfare : A Short Survey", *Economic and Labour Relations Review*, 2:2, 45-64.
- Nickell, S.R., Wadhvani, S. and Wall, M. (1989) 'Unions and Productivity Growth in Britain 1974-86: Evidence from UK Company Accounts Data', London School of Economics, Centre for Labour Economics, Discussion Paper 353.
- Nolan, P. and Marginson P. (1990), 'Skating on Thin Ice?: David Metcalf on Trade Unions and Productivity', *British Journal of Industrial Relations*, 28:2, pp. 216-248.
- Pencavel, J. (1977), 'Distributional and Efficiency Effects of Trade Unions in Britain', *British Journal of Industrial Relations*, 15, pp. 137-156.
- Wilson, N. (1989) 'Unionisation, Wages and Productivity: Some British Evidence', University of Bradford, Occasional Paper 8901.

# The Impact Of Multiple Unionism On The Enterprise

John Benson and Elsa Underhill

## INTRODUCTION

A considerable volume of work has emerged in the past decade on the economic impact of unions. In the main these studies have concentrated on examining the differences between the union and non-union workplace. One relatively unexplored aspect of workplace union structure is multiple unionism, that is, where more than one union exists at a given workplace.

This question has a particular relevance for Australia. The development of unions along craft lines has meant that the typical Australian workplace has more than one union present. The Australian Workplace Industrial Relations Survey found, for example, that 65 per cent of workplaces that employed at least 20 employees had two or more unions operating within the workplace. Even in the smaller workplaces (5 to 19 employees) some 29 per cent could be classified as multi-unionised.

The perceived problems of such workplace trade union structure have been the basis of debate for some time. More recently the Committee of Review into Australian Industrial Relations Law and Systems (1985) advocated trade union reform arguing craft unionism created difficulties for managers in having to deal with a number of unions and provided the potential for demarcation disputes to occur. Changes to the Industrial Relations Act 1988 concerning the size of organisations eligible for registration are also premised on the need to reduce the number of unions operating at each workplace. Yet the majority of managers responding to the Australian Workplace Industrial Relations Survey did not concur. Only 20 per cent of these managers claimed that overlapping coverage by unions has created problems at the workplace. This, it appeared, was more likely to be the case in large workplaces and industries such as transport and electricity.

This paper will use data from the Australian Workplace Industrial Relations Survey to examine the relationship between the number of unions present at the workplace and a range of economic and industrial relations outcomes. After reviewing the literature the paper presents a number of models by which these relationships are tested. Included in each model are a number of control variables as well as other measures of union structure at the workplace.

## MULTIPLE UNIONISM AND WORKPLACE INDUSTRIAL RELATIONS

Trade unions in Australia are, in the main, organised on a craft or occupational basis. Only in isolated circumstances have industrial or enterprise unions developed. As a consequence, it is possible for any one workplace to have a number of trade unions representing employees. This form of trade union organisation has led to the view that the typical Australian workplace has a multiplicity of unions operating within it.

The Australian Workplace Industrial Relations Survey found that 80 per cent of workplaces that employed at least 20 employees were unionised, that is they had at least one union member amongst their employees (Callus, Morehead, Cully and Buchanan, 1991:101). Within these workplaces the number of unions ranged between one and twenty-five which would appear to give some support to the view that multiple unionism is prevalent in Australia. Yet the average number of unions per unionised workplace was less than three, with in excess of 90 percent of all workplaces having four or less unions present.

Significant variation existed between workplaces when broken down by size, sector and industry. Typically, the number of unions present within a workplace increased with the size of that workplace. Workplaces with smaller numbers of unions present tend to come from identifiable industries. In particular, manufacturing, construction, wholesale and retail trade, recreation and personal services, and finance were all industries where in excess of 50 per cent of all workplaces had 2 or less unions present. In the finance and business sector 93 per cent of all workplaces fell into this category. The variation between industries can, in part, be explained by the relationship between industries and sector. For example, 74 per cent of all workplaces in the private sector had 2 or less unions present compared to only 40 per cent of those in the public sector.

Notwithstanding the above figures there has been for some time a general belief that Australia has too many unions and that multiple unionism imposes a high economic and industrial relations cost on the enterprise. Three recent reports have consolidated this view. The Committee of Review into Australian Industrial Relations Law and Systems (1985) identified a number of problems with the predominantly craft union structure:

- the problems experienced by unions in representing the interests of their members with resources which are extended or diffused;
- the difficulties that can arise in the resolution of disputes when employers are obliged to deal with a wide range of unions, each, perhaps, with different objectives and expectations; and
- the potential for demarcation disputes to occur between the various different organisations (Committee of Review, Vol.2, 1985:460).

Given these problems the Committee recommended that the minimum size of a union capable of gaining and maintaining registration be raised from 100 to 1000 members. As 45 per cent of unions, at the time of the Review, had less than 1000 members then the potential impact of this recommendation could be substantial.

In response to what it perceived as increasing pressures on the trade union movement, including a substantial decline in trade union membership, the leadership of the Australian Council of Trade Unions (ACTU) argued that "if Australian unions are to develop and implement a strategy for the future it is of the utmost importance that they consolidate their organisational base". The preferred structure was to reduce, via amalgamations, the 326 unions to 17 broad industry federations. This, it was claimed, would improve each union's effectiveness and efficiency in recruiting and servicing members (ACTU, 1987). In 1991 the ACTU affiliated unions endorsed this strategy.

The Business Council of Australia in their report "Enterprise Based Bargaining Units: A Better Way of Working" (1989) outlines the problems of the current craft union structure in terms of lower productivity, poor skill development and less flexibility. Their solution was deemed to be the restructuring of unions with an enterprise focus so that there would be fewer bargaining units at the workplace.

From the foregoing it can be seen that the major parties in the industrial relations arena were in favour of a reform of the structure of trade unions, although the reasons for support of the reform varied. The Federal Government (based on the Committee of Review recommendations and with general support from the trade union movement) put into place three key policy decisions:

- (a) Increased the minimum size for trade unions to be capable of gaining and maintaining registration to 10,000 members (1988 increased to 1000 and 10000 in 1991). Of the current 149 unions registered under the federal Act only 57 will be eligible to maintain their registration.
- (b) Introduced section 118 into the 1988 Industrial Relations Act. This provision gave the Commission the power to award one union the exclusive right to represent a group of workers, or alternatively, to exclude a union from representing a particular group of workers. Using this mechanism a union could gain sole coverage of workers at a workplace, enterprise or industry.
- (c) Inserted new provisions covering the procedures for the amalgamation of trade unions. These provisions would, it was argued, speed up the amalgamation process. This would be particularly the case for unions who had a community of interests.

These policies in combination would go a considerable way to reducing the number of unions in Australia and the number of unions in a particular workplace via providing an incentive for unions to amalgamate or legally forcing out of the workplace unions with a small number of members. Yet there is little concrete evidence that the existence of multiple unions in the workplace is responsible for the problems outlined in the three reports discussed above. With the public release of the Australian Workplace Industrial Relations Survey (AWIRS) data it is now possible to test the impact of multiple unionism.

This paper will test a number of hypotheses that relate multiple unionism to a range of workplace issues. These are: whether enterprise negotiations take place, the use of procedure, the level of productivity, the ability to implement organisational change and the level of industrial action. The research methodology of the survey can be found in Callus et al.(1991:5-16). For each issue a model is presented

which has a set of common control variables (number of unions, union density, single site, enterprise size and industry classification). To each model is added a number of other variables that are informed by the literature. Finally for each model two versions are presented; the standard model and the standard model with inter-union organisation included. The rationale for the two versions of each model is based on research which indicates it is not the presence of multiple unionism *per se* that is important but whether these unions act collectively (Horn and Wolinsky, 1988; Machin, Stewart and van Reenen, 1992).

## **THEORETICAL BASIS FOR THE MODELS**

### **Common Control Variables**

The models consist of five common control variables, supplemented by variables specified to each model. The common control variables include factors generally considered to impact on each of the dependent variables. Controlling for these variables ensures associations are not attributed to variables which are more correctly related to factors such as workplace size. The additional variables specified to each model are factors commonly identified in the literature as important to the dependent variable being addressed.

### ***Inter-Union Organisation***

Studies on the impact of inter-union committees at the workplace generally point toward a greater degree of co-operation between unions at the workplace (Brown et al., 1978). Inter-union committees, especially those involving joint-union bargaining with management, are likely to negate some of the divisiveness and inter-union disputes commonly associated with multi-unionism. Drago and Wooden (1990) tested for the significance of inter-union site committees on levels of disputes in Australia, and found a positive association between plant closures and inter-union committees. But recent empirical testing by Machin et al., (1992) suggest otherwise. Testing for the significance of multi-unionism in British workplaces with the WIRS 1984 survey, they concluded "what matters is not the presence of multiple recognition, but whether or not multiple unions bargain en masse or as individual entities" (1992:17). Hence, the models control for inter-union consultation in the second stage of analysis. In the first stage the same models are tested without inter-union committees. The potential muting impact of co-ordination on multi-unionism is therefore removed.

### ***Employment Size***

Workplace size affects a range of workplace industrial relations attributes (Marginson, 1984). Size typically has a positive association with union density and, where union membership is occupationally based, the number of unions present. A stronger union presence, in turn, may result in more active workplace bargaining and industrial action, as noted by Callus et al., (1991:168-74), and require greater co-ordination between union delegates through site committees (Brown, Ebsworth and Terry, 1978). Larger workplaces are also likely to require more formal procedural arrangements to facilitate stability and constancy in

arrangements between employees and management. Workplace size may have a positive association with labour productivity. Larger workplaces, it has been argued, have greater capacity to offer remuneration arrangements which attract and retain better quality workers as well as facilitate skill acquisition through internal labour markets (Brown, Hayles, Hughes and Rowe, 1984). Such factors potentially enhance labour productivity.

### *Union Density*

The third factor controlled for is union density. The importance of union density for workplace industrial relations has been noted earlier in relation to workplace size outcomes. Union density has other noted associations with respect to productivity and the monopoly face of unionism, although the relationship of union density with productivity may not be linear. British research indicates higher productivity levels are likely at medium levels of density (around 60-70%), but diminish as union density increases further (Wilson and Cable, 1991). In this study, consistent with other Australian studies, linearity is assumed (Crockett et al., 1992).

### *Single Site*

British research suggests the status of a workplace, as either a single stand-alone workplace or one of several workplaces belonging to a larger organisation, is a major determinant of workplace autonomy (Marginson, Edwards, Martin, Purcell and Sisson, 1988). In the Australian context, according to Callus et al., (1991), the importance of single or multi-establishment status extends even further. "Many aspects of a workplace, such as the location of bargaining, union membership arrangements and the ability of the workplace to insulate itself from competitive pressures derive from it being part of a wider organisation" (Callus et al., 1991:25). Other outcomes associated with multi-plant workplaces include a more structured approach to industrial relations by management and the existence of grievance procedures.

### *Industry*

As with workplace size, industry location has been identified as a major determinant of industrial relations outcomes and is controlled for in each of the models. Industry location envelopes a range of factors which interact to produce particular outcomes. Some of these include the predominance of blue/white collar, male/female, full/part-time employment which will affect levels of industrial action, the nature of unionism and associated activities. Inter-industry differences also exist with respect to wage and employment conditions, levels of capital intensity and associated labour productivity.

## MODEL SPECIFIC CONTROL VARIABLES

### Model 1: Labour Productivity

Multi-unionism is alleged to impede labour productivity because workers identify with their union and occupation rather than focussing on their employing organisation (Blandy, Sloan and Wooden, 1989; BCA, 1989). Demarcation, over-manning and jurisdictional disputes flow from this. Changes at the workplace which may enhance productivity are assessed by workers in terms of the threat to their 'traditional' interests rather than the longer-term benefits to the organisation. Model one includes a range of factors commonly regarded as important to labour productivity. The nature and level of technology at the workplace directly affects output and labour productivity levels at the workplace. Motivational aspects of employment, such as the relationship between wages, payment systems and worker effort are controlled for. Labour productivity is also subject to the ability of workers to perform tasks competently. Levels of training, skill and labour turnover control variables capture this last association.

### *Organisational Change*

The major source of productivity growth across nations this century has been developments in technology (Blandy and Blummit, 1990:8-11). Hence workplaces which have introduced major new plant, equipment or office technology in the 2 years prior to the AWIRS survey may be expected to experience relatively higher levels of labour productivity. Two caveats apply here. Firstly, the change may have been introduced in response to relatively low levels of labour productivity, so that the present position reflects average productivity levels. Secondly, the full benefits of the change may not yet have been realised, so that present levels of labour productivity are again around the average.

### *Non-managerial Earnings*

Efficiency wage theories propose that higher effort levels can be achieved through the payment of higher wages. Workers, it is argued, will be less inclined to risk shirking with associated higher costs of unemployment, and more likely to offer a 'gift' of greater work effort in return for greater benefits from the employer. Reduced labour turnover may also accrue as workers will be less inclined to voluntarily leave a high paying firm. The increased effort and stable workforce, coupled with the firms ability to attract higher quality workers through higher wages, will enhance levels of labour productivity (Akerlof and Yellen, 1986). Empirical studies also support the contention that relatively higher labour productivity, in some circumstances, is related to relatively higher wage levels (Nolan and Brown, 1983).

### *Performance Related Pay and Employee Share Ownership*

There is growing support for linking pay and worker performance, notwithstanding the ambiguous evidence on the relationship between performance related payment schemes, employee share ownership and labour productivity (Peetz, 1988). The

broad definition in AWIRS of performance related pay, which includes piece rates and payment systems tied directly to output, as well as reward for merit, blurs the veracity of this variable. Piece rate systems are more likely to occur in workplaces with relatively high levels of labour intensity, which are not necessarily associated with higher than average levels of labour productivity. This may negate the presence of workplaces with higher levels of labour productivity and other forms of performance pay identified in the survey.

### *Level of Skill and Employee/Supervisor Training*

Increased workforce skill levels provide a partial explanation for productivity growth over time (Blandy and Brummit, 1990). More highly educated and skilled workers are potentially more adaptable to change and better able to perform their tasks, hence the proportion of the workforce with trade and professional skills are included in this model. Another aspect of skill, the provision of training, is also included as it may offer a more informed picture of management's attitude to skill development, compared to data on the proportion of skilled workers employed. On-going skill development in an environment of technological and organisational change is more likely to facilitate the introduction and maximum use of that change.

The provision of formal training in industrial relations for first line management offers a similar dimension for enhanced labour productivity as that identified for training in general. First line management equipped with 'people management' skills would be expected to manage problems arising from organisational and technical change more ably, as well as day to day problems which can impact on general levels of morale and co-operation, and in turn labour productivity.

### *Labour Turnover*

Workplaces which emphasise on-the-job training and co-operation between workers, particularly team work, require a stable workforce to maximise labour utilisation. High levels of labour turnover limit the extent and effectiveness of on-the-job training as well as interrupting team norms, both of which impact negatively on labour productivity. Evidence also indicates that labour turnover is, inter alia, related to the level of commitment and motivation of the workforce (Cotton and Tuttle, 1986), suggesting that workplaces with high levels of labour turnover may generally have a lower rate of labour productivity.

### *Tenure of Manager Responsible for Employee Relations*

Workplaces experiencing instability in the position of employee relations manager (or the person most responsible for employee relations) may have had an associated discontinuity in employee relations practices, impacting negatively on workplace performance. The arrival of managers unfamiliar with custom and practice at the workplace can also impede performance through inappropriate decisions being taken (Rimmer and Underhill, 1992). Problems of poor workplace performance, traditionally viewed as a worker problem, are increasingly being recognised as

management related, for which tenure of employment for the employee relations management may provide a proxy (Hill, 1991).

### ***Labour Costs***

As indicated earlier, technological developments have been the major source of productivity growth this century. In Australia, the decline in annual labour productivity growth in the 1980s has been attributed in part to increased labour intensity resulting from the substitution of labour for capital investment (Dowrick, 1990). Capital intensive workplaces would therefore be expected to be associated with higher levels of labour productivity than labour intensive workplaces.

### ***Product Demand and Operating Capacity Levels***

Increasing demand for a product may be related positively to labour productivity due to diminished levels of labour hoarding as product demand increases. Further, as Akerloff and Yellen point out, workers simply work harder when there is more work and effort levels are balanced out over the longer term (1986:13). Workplaces experiencing increased product demand or operating at close to full capacity would be expected to have higher levels of labour productivity. The qualification to this, as noted by Crockett et al., (1992), is that as full capacity is approached, workplaces may experience inefficiencies arising from bottlenecks and the use of inferior capital.

### ***Grievance Procedures***

Procedures to channel and resolve workplace grievances in a manner satisfactory to both management and employees are likely to impact positively on levels of productivity. Regular use of a grievance procedure indicates acceptance of that procedure as an effective means of resolving problems before they impede workplace performance, potentially resulting in a positive relationship between productivity and use of procedures.

### ***Joint Consultation***

Productivity enhancing innovations and reforms at the workplace are likely to be facilitated by joint consultation between management, unions and workers. Alexander and Green's (1992) analysis of AWIRS highlights this relationship, as does Curtain et al.'s (1992) case study analysis of workplace reform. Joint consultation is therefore expected to be positively related to higher levels of productivity.

### **Model 2: Organisational Change**

Competitive success in a globally orientated market requires organisations to respond quickly and effectively to challenges. This adaptability is tied, inter alia, to technology, skills and workforce flexibility. Critics of multi-unionism point to the

occupational structure of unions as an impediment to these aspects of competitiveness. Sloan and Wooden (1990a), for example, referring to potential restructuring of union demarcation lines under the Structural Efficiency Principle[SEP], tentatively concluded that "the SEP is perceived to offer greater scope for change for workplaces with multiple union structures, where such structures may have hindered change." Model 2 tests for an association of multi-unionism with lower levels of organisational change, controlling for external and internal factors likely to be associated with change at the workplace. The external factors include changes in product demand and the degree of competition in the industry. Workplace specific factors include, *inter alia*, joint consultative committees, often a precursor to change, and the level of demarcation disputes which may indicate the extent to which protecting 'traditional' union lines impedes technological and organisational change.

### *Changes in Demand for the Workplaces Product/Service*

Change in product demand can be the catalyst for introducing organisational change to enable entry into new markets or simply to retain existing market share. Hence declining product demand would be expected to be positively associated with organisational change. The difficulty, however, is that depending on the timing of the change, product demand may have already responded and the workplace may now be facing stable or increasing product demand. This control variable may therefore be either negative or positive.

### *Market Competition*

Pressure for organisational change is weakened when an organisation has no other market competitors. Oligopolistic and monopoly markets have traditionally been regarded as less innovative than more competitive markets which may be under constant pressure to sustain market share. The shift towards a global economy, coupled with the emphasis on award restructuring since the late 1980s, suggests, however, that firms in oligopolistic market structures may now be as likely to experience organisational change as those in more competitive markets. A positive association is therefore expected between firms with few or many competitors, and a negative association for workplaces without competition.

### *Joint Consultation*

The implementation of substantial organisational change can be facilitated by the use of comprehensive consultative mechanisms between management, job delegates and employees. The process may be lengthened, but the changes are often more significant and enduring than those introduced without consultation (Curtain, Gough and Rimmer, 1992). Green and Macdonald's (1991) analysis of the AWIRS highlights the extent to which more significant workplace changes have occurred in workplaces with active union bargaining, a result similar to the British experience (Daniel, 1987). The existence of ongoing formal joint consultative committees is expected to be positively associated with organisational change.

### *Union Demarcation*

Union concern over traditional skill retention is viewed as an impediment to organisational change by practitioners and academics alike (ACTU, 1987; BCA, 1989; Blandy et al., 1989; Curtain et al., 1992). AWIRS requested information from delegates on the existence of serious disagreements between unions in the past year. Such disagreements are one outcome of perceived threats from organisational change and hence more prevalent in workplaces which have undergone change. Problems of timing again arise here bringing a degree of indeterminance. If workplaces underwent significant changes more than 12 months earlier, demarcations may have arisen and been resolved then, rather than captured by AWIRS.

### *Tenure of Employee Relations Manager*

It was noted earlier that problems of poor quality and productivity at the workplace are increasingly being recognised as a product of poor management (Hill, 1991). Bushe's (1988) study of change projects similarly draws attention to the ability of management to subvert organisational change when it threatens hierarchical structures. This suggests two possible influences, with alternate outcomes, acting upon change in relation to tenure of the manager responsible for employee relations. On the one hand, those with extended experience of the workplace may be better equipped to successfully negotiate the change. On the other hand, however, an 'outsider' such as a new employee relations manager, may be more prepared to initiate change which would otherwise destabilise existing power structures at the workplace.

### *Level of Skill*

Organisational changes that result in new work formations and devolved responsibility are likely to be associated with a more highly skilled workforce which is able to adapt to such changes. Lesser skilled workers whose income levels or job security, for example, depend upon overtime associated with inefficient production techniques, are more likely to resist organisational change (Rimmer, 1992).

### *Workplace Age*

As organisations focus upon improving performance in competitive markets, older workplaces would be expected to undergo more significant changes than more recently established workplaces. Older workplaces will be under greater pressure, for example, to shift away from hierarchical management structures, and to invest in technological innovations necessary for sustaining a competitive position.

### **Model 3: Workplace Negotiations**

The recent shift towards enterprise bargaining has turned attention to the ability of unions to resource bargaining at this level. Critics of multiple unionism point to

the nature and duplicity of union representation as problematic for workplace negotiation. Occupational unions, spread across a range of industries and workplaces, have only a limited ability to respond to the circumstances of a particular workplace (ACTU, 1987). Multiple bargaining units, a supposed outcome of multi-unionism, are regarded as inefficient and impede effective mechanisms for worker representation (Blandy, Sloan and Wooden, 1989). Single union representation, by contrast, is more conducive to enterprise-based bargaining (Sloan & Wooden, 1990a; BCA, 1989). The measure of workplace negotiations in Model 3 is whether management have negotiated with union delegates over any workplace issue.

### *Frequency of Visits from Full-time Officials*

Intuition suggests that workplace negotiations will be less common when workplaces are characterised by frequent visits from full-time officials. Such workplaces, it might be argued, lack adequately skilled and experienced job delegates to participate in negotiations, and management are indicating a preference for negotiating with full-time officials. The evidence however, both for Australia and Great Britain, indicates otherwise. Callus et al., (1991:177) highlight the more frequent visits by full-time officials to workplaces defined as active bargainers compared with inactive workplaces. Brown et al., (1978), in a study of British shop stewards, found similar results (see also Kelly and Heery, 1989). Rather than steward organisation thriving on neglect, full-time union officials have a greater presence in workplaces where negotiations take place.

### *Training of Union Delegates*

Union delegates equipped with appropriate skills to participate in bargaining would be expected to be more confident and willing to negotiate with workplace management. Participation in union training by delegates may also indicate a higher level of commitment to the role of unions at the workplace by delegates. Callus et al., (1991:177) found that delegates in workplaces exhibiting active bargaining were much more likely to have participated in union training than their counterparts in less active workplaces.

### *Supervisor Training*

As with union delegates, equipping line management with appropriate industrial relations skills would also appear necessary to facilitate negotiations at the workplace. Organisations encouraging devolution and workplace negotiations, would be expected to facilitate devolved responsibility by investing in training for supervisors.

### *Company/enterprise Award*

The type of award coverage may reflect different attitudes towards workplace bargaining. Single company awards may be associated with a greater level of workplace negotiations because the very nature of these awards suggests an

enhanced sensitivity to workplace requirements. Sloan and Wooden's (1990b) study of the implementation of the Structural Efficiency Principle in BCA member firms found that workplace management and union delegates were most likely to be involved in negotiations when the award covered a single employer. Two factors, however, may result in a reverse association between award status and workplace negotiations. Firstly, workplaces which formalise site specific outcomes into an award may rely more heavily on the participation of full-time union officials rather than job delegates. Secondly, workplaces governed by multi-employer awards may have a greater need for workplace negotiations to accommodate shifts away from award standards, without formalising such negotiations into a single employer award.

#### **Model 4: Use of Procedures**

Government Reports on industrial relations systems, both in Australia (Committee of Review, 1985) and Great Britain (Royal Commission, 1968), have highlighted the importance of grievance procedures as a means of improving industrial relationships at the workplace. This model focuses on the frequency of use of grievance procedures as a proxy for their effectiveness. Procedures which fail to meet the needs of the parties would be expected to be discarded and alternate forms of grievance settlement adopted. A procedure used regularly, on the other hand, is likely to be accepted by the participants as an effective means of resolving workplace problems and potentially enhancing the workplace industrial relations environment. Multi-unionism is regarded as an impediment to effective grievance procedures at the workplace. The involvement of too many unions compounded by a focus away from the workplace combine to limit the development and utilisation of grievance procedures (see for example, Wooden, 1990). The effectiveness of grievance procedures is contingent on a range of factors. In particular, the source of the procedure, and the widespread knowledge and understanding of the procedure are regarded as critical factors.

#### ***Source of Grievance Procedure***

An important determinant of the use of procedures is authoring by the parties responsible for their implementation (Royal Commission, 1968:170; Benson, 1991:84). When procedures are developed through joint negotiation, "the aspirations and concerns of the participants are taken into account and the final product will recognise the norms of the workplace" (Benson, 1991:84). AWIRS specifies where the grievance procedure has arisen from negotiation between management and unions at the workplace, as distinct from being imposed by forces beyond the workplace.

#### ***Presence of a Union Delegate***

Typical grievance procedures designate a formal role for job delegates in the process of dispute resolution (White, 1987). A factor contributing to the use of procedures would therefore appear to be the presence of a delegate at the workplace to support and encourage the use of grievance procedures.

### *Union Delegate and Supervisor Training*

An appreciation of the role of formal procedures in grievance resolution may be an outcome of industrial relations training for job delegates and supervisors alike. Appropriate training of those responsible for the early instigation of procedures is also likely to encourage their more frequent use.

### *Proportion of NESB employees*

Language and literacy skills are likely to impede dissemination of information and understanding of procedures operating at the workplace. Whilst AWIRS does not capture literacy problems in the workforce generally, it does provide information on the proportion of the workforce with a Non-English Speaking Background (NESB). The use of procedures may be less common as the proportion of NESB workers in the workforce increases. Anecdotal evidence, however, suggests that NESB workers may be more inclined to follow formal procedures as these tend to protect workers from discrimination and favouritism.

### *Proportion of Part-time, Casuals and Female Employees*

Procedures may also be used less frequently when a high proportion of the workforce is either casual and/or part-time. As females form the majority of part-time employees, a similar association may exist for female workers. The shorter work attendance time for these workers may reduce their knowledge of available grievance procedures, whilst also diminishing the likelihood of using procedures even when aware of them. Casuals, with minimal job security, may be unwilling to air a grievance for fear of job loss. Part-timers, whilst potentially having greater job security, may be concerned about potential discriminatory outcomes which might prevent future translation to full-time employment. Grievances may be suffered rather than voiced when fewer hours are spent at the workplace and when workers do not have a long term commitment to their present employment.

### *Rotating Shift Work*

Another factor potentially impeding communication and use of grievance procedures is the presence of rotating shift work at the workplace. The logistics of providing information to workers attending over a range of different hours may dilute information dissemination. On-going communication between job delegates and workers may also suffer, with workers developing alternate means of overcoming grievances (Royal Commission, 1968:106).

### *Number of Staff Working in Industrial Relations*

Overseas evidence points to the symbiotic relationship between industrial relations/personnel staff and union presence at the workplace (Kochan and Cappelli, 1984). One manifestation of this is the increased likelihood that industrial relations staff will actively promote the development and use of procedures which regulate workplace industrial relations. A positive association would therefore be

expected between the number of industrial relations staff and the use of grievance procedures.

### **Model 5: Industrial Action**

Multiple unions at the workplace are associated with demarcation and jurisdiction disputes, but these disputes are insignificant when measured by days lost from withdrawal of labour. Critics of multi-unionism identify disputes of this nature, but also highlight a more subtle relationship between multi-unionism and industrial action (BCA, 1989). A poorer industrial relations environment, brought about by impeded communication, a focus on union rather than company interests, and under-resourced worker representation is seen to contribute to higher levels of industrial action. That unions are conscious of, and promote, flow-on effects between workplaces further enhances the propensity of workplaces with multiple-unions to take industrial action.

Model 5 controls for factors, such as internal procedures, which may minimise the need for industrial action. Likewise, the nature of rules governing the workplace may be associated with a 'workplace consciousness' not dissimilar to the lack of such identified by multi-unionism critics. The nature of the workforce and associated levels of industrial action requires a range of control variables. Included here are measures of blue/white collar status, gender predominance and the extent of part-time workers.

#### ***Use of Procedure***

It was noted previously that Government Reports have highlighted the importance of grievance procedures as a means of improving industrial relationships at the workplace. A grievance procedure which resolves problems speedily and close to the source of the problem should minimise the need for industrial action (White, 1987). A negative relationship is therefore expected between the incidence of industrial action and the use of grievance procedures.

#### ***Company/Enterprise Award***

The BCA (1989) have actively promoted the merits of enterprise bargaining as a means of shifting the focus of employees towards the welfare of the organisation, away from issues emanating beyond the workplace. The existence of a company/enterprise award is used here as a proxy for an enhanced enterprise focus. Drago and Wooden (1990) found company awards to have a significant negative association with plant closures through industrial action, whilst being unrelated to the number of stoppages. Although the impact of multi-employer award coverage of a workplace varies substantially between workplaces (Lansbury and McDonald, 1992:212-234), an award specified for a workplace may meet the needs of that workplace more comprehensively and in turn reduce the need for industrial action.

### ***Union Delegate and Supervisor Training***

Skills to negotiate and participate in workplace industrial relations issues have been noted as relevant to Models 3 and 4, and may be equally important in mitigating the need for industrial action. Industrial relations training for delegates and supervisor is therefore expected to have a negative association with industrial action. On the other hand, however, a trained union delegate may be more conscious of workplace grievances and more confident of carrying the workforce through industrial action, potentially lending this variable to a positive association.

### ***Tenure of Employee Relations Manager***

A new employee relations manager entering a workplace may be susceptible to breaching custom and practice and inducing a workforce response of industrial action (Rimmer and Underhill, 1992). This may occur through insufficient knowledge, or because the manager views it as necessary to change pre-existing practices. A negative association is therefore expected between the tenure of the manager most responsible for employee relations and the level of industrial action at the workplace.

### ***Workplace Autonomy***

Workplace management lacking authority to decide upon workplace issues may impede effective workplace negotiations. One outcome of this may be the taking of industrial action by the workforce to compel a decision at the workplace. Another outcome may be industrial action in response to decisions taken beyond the workplace and perceived as inappropriate by the workforce.

### ***Organisational Change***

The uncertainty brought about through organisational change, the potential for destabilisation of power relationships, and simply the need for increased interaction between union officials and members through stop-work meetings, suggests organisational change is likely to be accompanied by a degree of industrial action.

### ***Joint Consultation***

Enhanced consultation, particularly greater information dissemination and two-way communication at the workplace, may mitigate the need for industrial action at the workplace. This is especially likely to be the case where the consultation is formalised and regular rather than ad-hoc.

### ***Workforce Characteristics***

A number of workforce characteristics have been associated with a higher propensity to take industrial action. Australian and overseas evidence points to

blue-collar workers being more strike prone than white-collar workers (Drago and Wooden, 1990; Smith et al., 1978). Shorey (1976) argues that female workers are less likely to take industrial action than males, as their perceived benefits of such action may be less. Part-time workers are similar. The explanations for their lower levels of unionisation (Peetz, 1990) would appear equally applicable to their propensity to participate in industrial action. This model includes control variables for the proportion of the workforce being manual, female and part-time.

### *Labour Intensity and Average Level of Earnings*

Firms with higher levels of labour costs to total costs would be expected to be more sensitive to the level of earnings at a workplace than capital intensive workplaces. Demands for wage increases in labour intensive workplaces are more likely to be resisted, resulting in a greater propensity for industrial action to achieve wage increases. The average level of earnings at the workplace may similarly influence the taking of industrial action. Workers with lower average levels of earnings may find the need to take industrial action, to support wage claims, more pressing. An alternative interpretation, however, might suggest the lower levels of earnings are an outcome of a compliant workforce unwilling to enforce claims through action.

## ANALYSIS

### Methodological Issues

The data used for this study is drawn from the Australian Workplace Industrial Relations Survey. This national survey was conducted in the period October 1989 to May 1990 and included a stratified random sample of 2004 workplaces which employed a minimum of 20 employees. Sample design and weightings were devised by the Australian Bureau of Statistics and allow for accurate national estimates to be made. At each selected workplace a general employee profile questionnaire was completed and extensive face-to-face interviews were conducted with the general manager, the manager responsible for employee relations and, if the workplace had local union delegates, the most senior delegate of the largest union. The overall refusal rate was 12.5% which has ensured a low level of non-response bias (for more details on the methodology of the Survey see Callus et al., 1991:5-13).

In this study only data relating to commercial enterprises has been utilised. This includes private sector workplaces, government business enterprises and commercial statutory authorities, and a range of other commercial type organisations. With two exceptions (union demarcation and visits by full-time union officials) all variables have been constructed using responses from management personnel. The theoretical basis for each of the seven models presented in this section was discussed earlier in this paper. The operationalisation of the variables contained in these models is specified in Appendix 1.

The models have been estimated using a variety of regression methods. Where the dependent variable is composed of interval data the ordinary least squares technique is adopted. Where the data is of the discrete type the probit probability method is employed. In this latter case this has also included the ordered probit

method. All data has been weighted by the appropriate weights adjusted to keep the sample size equal to the actual number of observations.

The five models are presented in Tables 1 to 5. For each dependent variable two versions of the model are presented. The sole difference is the inclusion in Part II of the model of the variable inter-union organisation. This has the effect of reducing the number of observations and, in some cases, the significance of particular independent variables.

## Results and Discussion

### *Model 1: Labour Productivity*

Model 1 does not support the contention that multiple unionism impedes labour productivity. Although the number of unions was not significant in either Part I or Part II of Model 1, the direction evidence points toward a weak negative association between number of unions and higher levels of labour productivity. This association weakened further when inter-union organisation was included in the model. Part II of Model 1 therefore does not support the Machin et al., (1992:17) contention that it is the form of co-operation between unions which is of importance rather than the number of unions. In this case the existence of inter-union committees, representing a cross-section of the workforce, also had a negative relationship to productivity, but again was statistically insignificant.

A number of the control variables had a statistically significant relationship with productivity. Three of these variables, non-managerial earnings, the tenure of the employee relations manager and employee skill level, had the expected positive association with levels of labour productivity. Only one of these remained significant when union committees were included in the model. In that case, performance related pay became significantly negatively associated with productivity. In contrast to the literature, the frequency of use of grievance procedures was negatively related to productivity. This was consistent across both versions of the model. This suggests that whilst grievance procedures provide a systematic way to resolve issues that arise at the workplace they may also represent a failing of the less formal methods that often contribute significantly to the workplace climate.

### *Model 2: Organisational Change*

This model provides weak support for the contention that multiple unions may impede organisational change, with multiple unionism indicating a negative relationship at the 10 per cent level in both parts of the model. By contrast inter-union committees are significantly related to higher levels of organisational change. The positive association of inter-union committees with technological and organisational change may arise from the role such committees play in the change process. When major changes occur at the workplace, the consequences will be sufficiently widespread that unions can only respond when they understand the full implications of the change. This may require regular meetings of delegates representing all workers on site. In other words, the change itself highlights the need for more sophisticated forms of union organisation. Where unions do not

respond in such a manner, levels of resistance may be heightened and lower levels of change achieved.

The model specific variables predominantly had the associations expected. Joint consultation has a strong positive association and, like inter-union committees, may be a spin-off of the process of change. As indicated in the literature, successful implementation of major change at the workplace is most commonly found in workplaces which develop joint-consultative mechanisms. These results are consistent with the findings of Alexander and Green (1992) with respect to the role of joint consultative committees.

One exception to the theoretical explanations noted earlier concerns the negative association between the degree of product market competition and change. Workplaces facing a high level of competition were less likely to have implemented changes than those with lower levels of competition. It will be recalled that the pressures for change emanating from increased global competition and award restructuring was likely to impact on oligolistic as well as more competitive product markets. Green and McDonald's (1991) analysis of AWIRS highlights the extent to which larger workplaces were more likely to have introduced multiple changes. The larger firms, in turn, may be confronting fewer competitors and conform to the interpretation here of less competition being associated with higher degrees of change.

### ***Model 3: Workplace Negotiations***

Multi-unionism is related to the existence of workplace negotiation. The positive association suggests negotiations are more likely to occur in workplaces with multiple unions. This association is strengthened by the inclusion of inter-union committees in Part II of the model. The existence of workplace inter-union committees would suggest a higher degree of organised union activity which would flow to a higher likelihood of negotiations. This is evident from Model 3 although the relationship is not strong.

Turning to model specific variables, workplace size, visits by union officials and supervisor training are, as expected, significantly associated with workplace bargaining. Supporters of enterprise awards have argued, *inter alia*, that such awards will lead to improved communication within the workplace. In contrast Model 3 indicates that workplace negotiations, one element of workplace communication, are not significantly associated with such awards. Instead, and as supported by the literature, workplace negotiations co-exist more often with full-time union officials taking an active interest in the workplace. Contrary to expectations and evidence elsewhere (Callus et al., 1991), delegate training does not have a strong association with workplace negotiations. This may be an outcome similar to that found with inter-union committees. Trained delegates may be regarded by management as consulting rather than negotiating, or resolving problems independently of management intervention. In Part II of the model visits by full-time union officials ceased to be statistically significant. This would suggest that inter-union committees take on part of the role of these full-time officials.

### *Model 4: Use of Procedures*

Model 4 offers some insight into the use of procedures and multi-unionism at the workplace. Few differences are evident between Part I and Part II of the model. Both versions produce a significant result on number of unions, although this relationship is weakened with the inclusion of inter-union committees. This suggests that the committee may displace the more formal procedures for dispute resolution by enabling grievance resolution through committee networks.

The directions of the signs for the control variables were generally consistent with expectations. Three of these variables proved to be significantly related to the use of procedures and confirm the importance of union and management training and workplace ownership of the procedure. The interaction of delegates and supervisors is commonly the first step in grievance procedures, hence their willingness to initiate a grievance procedure is critical to its success. Where the players are trained in industrial relations, and grievance procedures have been developed at the workplace, then such procedures are likely to be adhered to irrespective of the form of union organisation.

### *Model 5: Industrial Action*

Multi-unionism has a weak negative association with the taking of industrial action. This finding occurred irrespective of the inclusion of inter-union committees in Part II of the model. The proposition that sectional interests might be anticipated with higher numbers of unions, matched by sectional and hence more occasional industrial action, is not supported by this model. Inter-union committees were, however, found to be positively related to industrial action, although the relationship was not statistically significant. One explanation for this finding is that industrial action requires a degree of co-ordination. In multi-union workplaces this co-ordination is often achieved through inter-union committees.

Significant associations were found with a number of the control variables, although not always in the direction expected. Workplaces with a higher proportion of female workers, higher labour costs and with higher relative earnings were associated with lower levels of conflict. Of these only the second, labour costs, was contrary to prediction. Part of the reason for this finding may be that workplaces with a higher percentage of labour costs are located in sectors that have been traditionally weak in union organisation. One example is community services where 84 per cent of workplaces had labour costs in excess of 60 per cent. Delegate training and workplace autonomy were associated with significantly higher levels of industrial action. Whilst the predicted direction of delegate training was ambiguous, workplace autonomy is difficult to explain. One explanation for this finding is that unionists in these workplaces are closer to the source of decision-making and thus perceive industrial action as potentially more likely to influence management. In these cases industrial action may vary substantially in form and length when compared to that occurring in workplaces where management have less discretion. Substantially different results were found in Part 2 of Model 5 with respect to the significance of the control variables. With the inclusion of inter-union organisation, workplace autonomy, labour costs and level of earnings become insignificant, whilst length of tenure of employee relations managers becomes statistically significant.

## CONCLUSION

This paper examined the relationship between multiple unionism and a range of workplace variables. Support for conventional wisdom, that multi-unionism results in negative outcomes at the workplace, was not substantiated. In particular, multiple unionism was found to be associated with significantly higher levels of negotiations and use of procedures and significantly lower levels of organisational change. No significant relationship was found with respect to multi-unionism and productivity or industrial action.

Research conducted in the United Kingdom has indicated that it is not the number of unions at the workplace that is the significant factor, but the degree of organisation between such unions. This proposition was not supported by the findings of this research. In each of the five models the inclusion of inter-union committees did not substantially alter the relationship between the number of unions and the dependent variable. Inter-union committees were, however, related to higher levels of organisational change and industrial action. In the former case the result was statistically significant.

Why then is multiple unionism only seen in the context of negative outcomes? We would argue that a partial answer lies with the distinction between 'visible' and 'invisible' effects. The visible effects are such outcomes as demarcation disputes, repetitious bargaining and the perceived difficulties in resolving disputes. Yet these effects can be ameliorated, and in some cases outweighed by the invisible effects. Workers, for example, can often develop a stronger identification with an occupationally based union which recognises their particular needs and services them accordingly. This can especially be the case in larger workplaces where inherent bureaucratic structures have an alienating effect. Equally, the closer relationship local delegates have with workers in their own occupation can lead to a more informed input into workplace problem solving and decision making. Workers are also more likely to gain better representation and service where delegates are in a competitive environment. These factors can contribute to higher levels of job satisfaction and motivation. If this is the case, then a multi-dimensional approach to analysing the outcomes of multi-unionism may be more appropriate.

**TABLE 1: LABOUR PRODUCTIVITY (WEIGHTED ORDERED PROBIT ANALYSIS)**

Variable	I	II
Constant	-2.237(0.335)	-2.134(0.518)
Number of Unions	-0.032(0.033)	-0.029(0.043)
Inter-union Organisation	-	-0.233(0.214)
Union Density	0.001(0.002)	0.000(0.003)
Single Site	-0.063(0.108)	0.031(0.176)
Workplace Size	-0.000(0.000)	0.000(0.000)
Industry		
Mining	0.263(0.320)	0.240(0.369)
Manufacturing (metals)	0.096(0.192)	0.004(0.275)
Manufacturing (non-metals)	0.288(0.190)	0.195(0.258)
Electricity gas and water	0.195(0.322)	0.227(0.354)
Construction	-0.482(0.230)*	-0.740(0.315)*
Wholesale/retail	0.083(0.129)	0.046(0.206)
Transport/communication	-0.080(0.178)	-0.157(0.238)
Banking/insurance/finance	0.446(0.166)**	-0.001(0.345)
[other services]		
Employee training	-0.086(0.100)	-0.030(0.149)
Organisational change	0.007(0.051)	0.055(0.073)
Performance-related pay	-0.012(0.026)	-0.076(0.042)#
Labour turnover	0.001(0.001)	-0.002(0.003)
Contracting product market	0.006(0.162)	-0.056(0.231)
Expanding product market	0.082(0.102)	-0.173(0.153)
Supervisor training	-0.009(0.041)	-0.003(0.060)
Labour costs (%)	0.009(0.045)	0.053(0.068)
Capacity	0.035(0.070)	-0.003(0.104)
Non-managerial earnings	0.195(0.052)**	0.305(0.080)**
Share	-0.219(0.138)	-0.300(0.204)
Tenure	0.079(0.037)*	0.034(0.054)
Skill	0.004(0.002)#	0.002(0.003)

(continued) →

<b>Joint Consultation</b>	0.019(0.090)	-0.043(0.130)
<b>Use of Procedure</b>	-0.077(0.034)*	-0.085(0.048)#
<b>Log likelihood</b>	-726.69	-348.50
<b>Number of workplaces</b>	683	631

Note: (1) standard errors in parentheses  
(2) significance levels \*\*  $p < .01$ , \*  $p < .05$ , #  $p < .10$

**TABLE 2: ORGANISATIONAL CHANGE (WEIGHTED OLS ANALYSIS)**

Variable	I	II
Constant	0.835(0.350)	0.839(0.353)
Number of Unions	-0.044(0.025)#	-0.048(0.026)#
Inter-union Organisation	-	0.331(0.149)*
Union Density	0.002(0.002)	0.002(0.002)
Single Site	0.066(0.108)	0.008(0.113)
Workplace Size	0.000(0.000)	0.000(0.000)
Industry		
Mining	-0.120(0.272)	-0.194(0.274)
Manufacturing (metals)	0.193(0.171)	0.048(0.183)
Manufacturing (non-metals)	0.143(0.174)	0.092(0.179)
Electricity gas and water	-0.200(0.246)	-0.178(0.246)
Construction	-0.221(0.241)	-0.282(0.243)
Wholesale/retail	0.057(0.131)	0.096(0.132)
Transport/communication	0.304(0.133)*	0.306(0.135)*
Banking/insurance/finance	0.084(0.229)	0.109(0.230)
[other services]		
Union demarcation	0.130(0.183)	0.070(0.192)
Contracting product market	-0.085(0.149)	-0.097(0.153)
Expanding product market	0.111(0.100)	0.089(0.099)
Market competition	-0.067(0.032)*	-0.068(0.033)*
Joint consultation	0.307(0.073)**	0.247(0.076)**
Skill	0.000(0.002)	0.000(0.002)
Tenure	0.022(0.033)	0.027(0.034)
Workplace Age	0.018(0.043)	0.019(0.044)
Adjusted R <sup>2</sup>	0.063	0.053
Number of Workplaces	467	454

Note: (1) standard errors in parentheses  
(2) significance levels \*\* p<.01, \* p<.05, # p<.10

**TABLE 3: WORKPLACE NEGOTIATIONS (WEIGHTED PROBIT ANALYSIS)**

Variable	I	II
Constant	-0.698(0.305)	-0.587(0.386)
Number of Unions	0.081(0.042)#	0.117(0.056)*
Inter-union Organisation	-	0.214(0.279)
Union Density	-0.001(0.003)	-0.003(0.003)
Single Site	-0.050(0.145)	-0.093(0.182)
Workplace Size	0.001(0.000)#	0.000(0.000)
Industry		
Mining	1.285(0.654)*	7.547(433039)
Manufacturing (metals)	0.520(0.262)*	0.620(0.329)#
Manufacturing (non-metals)	0.314(0.248)	0.796(0.334)*
Electricity gas and water	0.144(0.327)	0.128(0.336)
Construction	0.381(0.377)	0.420(0.391)
Wholesale/retail	-0.271(0.174)	-0.421(0.205)*
Transport/communication	0.592(0.201)**	0.478(0.222)*
Banking/insurance/finance	-0.569(0.219)**	-0.368(0.349)
[other services]		
Company/enterprise award	0.339(0.217)	0.381(0.265)
Visits by union officials	0.099(0.051)#	0.027(0.062)
Delegate training	0.158(0.147)	0.214(0.184)
Supervisory Training	0.138(0.054)*	0.169(0.063)**
Log likelihood	-296.41	-202.93
Number of workplaces	661	526

Note: (1) standard errors in parentheses  
 (2) significance levels \*\* p<.01, \* p<.05, # p<.10

**TABLE 4: USE OF PROCEDURES (WEIGHTED ORDERED PROBIT ANALYSIS)**

Variable	I	II
Constant	-3.043(1.255)	-2.950(1.284)
Number of Unions	0.084(0.028)**	0.061(0.034)#
Inter-union Organisation	-	-0.078(0.180)
Union Density	0.003(0.002)	0.004(0.003)
Single Site	-0.115(0.116)	-0.060(0.143)
Employment Size	-0.000(0.000)	-0.000(0.000)
Industry		
Mining	-0.163(0.326)	-0.245(0.344)
Manufacturing (metals)	0.202(0.205)	-0.002(0.245)
Manufacturing (non-metals)	0.019(0.198)	0.142(0.231)
Electricity gas and water	0.280(0.257)	0.191(0.265)
Construction	0.461(0.244)#	0.409(0.263)
Wholesale/retail	-0.193(0.160)	-0.232(0.187)
Transport/communication	0.347(0.155)*	0.280(0.176)
Banking/insurance/finance	0.451(0.178)*	0.564(0.277)*
[other services]		
Employees with English as a second language (%)	0.057(0.043)	0.030(0.051)
Casual employees (%)	0.002(0.004)	0.000(0.004)
Number of staff in IR	0.016(0.013)	0.019(0.015)
Shiftwork	0.129(0.110)	0.170(0.124)
Part-time employees (%)	0.003(0.004)	0.002(0.004)
Women employees (%)	-0.001(0.002)	0.000(0.003)

(continued) →

<b>Workplace developed procedures</b>	0.699(0.140)**	0.625(0.154)**
<b>Delegate Training</b>	0.281(0.122)*	0.487(0.154)**
<b>Supervisor Training</b>	0.157(0.041)**	0.135(0.042)**
<b>Job Delegate</b>	0.318(1.236)	0.157(1.256)
<b>Log likelihood</b>	-778.64	-572.63
<b>Number of workplaces</b>	740	466

Note: (1) standard errors in parentheses  
 (2) significance levels \*\* p<.01, \* p<.05, # p<.10

TABLE 5: INDUSTRIAL ACTION (WEIGHTED PROBIT ANALYSIS)

Variable	I	II
Constant	0.105(0.547)	-0.733(0.679)
Number of Unions	-0.062(0.045)	-0.082(0.053)
Inter-union Organisation	-	0.105(0.298)
Union Density	0.000(0.004)	-0.000(0.005)
Single Site	0.305(0.506)	0.102(0.568)
Workplace Size	0.000(0.000)	0.000(0.000)
Industry		
Mining	-0.366(0.459)	-0.898(0.534)#
Manufacturing (metals)	0.136(0.334)	0.077(0.380)
Manufacturing (non-metals)	-0.008(0.324)	-0.197(0.357)
Electricity gas and water	0.338(0.374)	0.220(0.388)
Construction	0.220(0.363)	0.087(0.394)
Wholesale/retail	0.046(0.263)	-0.047(0.311)
Transport/communication	0.315(0.274)	0.183(0.309)
Banking/insurance/finance	0.257(0.330)	-0.185(0.496)
[other services]		
Use of procedure	0.017(0.052)	-0.027(0.058)
Company/enterprise award	-0.079(0.211)	0.132(0.242)
Manual employees (%)	-0.004(0.003)	-0.001(0.004)
Women employees (%)	-0.008(0.004)*	-0.011(0.006)*
Part-time employees (%)	0.004(0.004)	0.010(0.005)#
Delegate Training	0.392(0.188)*	0.674(0.240)**
Supervisor Training	0.071(0.061)	0.086(0.070)
Workplace Autonomy	0.008(0.004)*	0.005(0.005)
Tenure	0.075(0.058)	0.125(0.066)#
Labour Costs	-0.158(0.068)*	-0.059(0.077)
Organisational Change	-0.105(0.078)	-0.042(0.093)
Joint Consultation	-0.182(0.142)	-0.246(0.166)
Non-Managerial Earnings	-0.145(0.082)#	-0.018(0.107)
Log likelihood	-229.56	-170.34
Number of workplaces	517	426

Note: (1) standard errors in parentheses  
 (2) significance levels \*\*  $p < .01$ , \*  $p < .05$ , #  $p < .10$

**APPENDIX 1: VARIABLE CONSTRUCTION AND DESCRIPTION**

Variable	AWIRS Question	Description
Number of unions	EK1	Number of unions at the workplace; if EK1=0 deleted
Inter-union organisation	EK24	Dummy variable=1 if delegates from different unions meet regularly as a committee; otherwise=0
Union density	N40	AWIRS derived variable; % of employees at workplace unionised
Single site	G11	Dummy variable=1 if not owned or controlled by another workplace; otherwise=0
Workplace Size	EMP	Number of employees at workplace
Industry Mining Manufacturing (Metals) Manufacturing (non-metals) Electricity, gas & water Construction Wholesale/Retail Transport/communication Banking/insurance/finance	GA2	Dummy variable=1 if Mining workplace Dummy variable=1 if Manufacturing (Metals) workplace Dummy variable=1 if Manufacturing (non-metals) workplace Dummy variable=1 if Electricity, gas & water workplace Dummy variable=1 if Construction workplace Dummy variable=1 if Wholesale/Retail workplace Dummy variable=1 if Transport/communication workplace Dummy variable=1 if Banking/insurance/finance workplace Omitted category Community/other services
Company/enterprise award	EB7f, EB7g, EB7h	Dummy variable=1 if the workplace has a company/enterprise award, enterprise appendices to award or voluntary employment agreements; otherwise=0
Visits by union officials	UB21	Frequency of enterprise visits by full-time union officials (1=not at all to 5=at least monthly)
Delegate training	EK18	Dummy variable=1 if union delegates are give time off to attend union training; otherwise=0
Employees with English as second language (%)	ED1c	% of employees within workplace who have English as a second language

(continued) →

Casual employees (%)	FTCT, PTCT, EMP	% of casual employees within workplace [(FTCT + PTCT) x100/EMP]
Number of staff in industrial relations	EA15	Number of employees working specifically on employee relations matters
Shiftwork	ED5	Dummy variable=1 if any employees within workplace work shiftwork; otherwise=0
Part-time employees (%)	N23	AWIRS derived variable; % of part-time employees in workplace
Women employees (%)	N22	AWIRS derived variable; % of women employees in workplace
Employee training	EJ14	Dummy variable=1 if workplace has provided skill enhancement training programme; otherwise=0
Organisational change	GE1a, GE1b, GE1g	Whether the workplace has made a change in product or service, restructured work or introduced new technology (0 to 3 changes)
Performance-related pay	EC3	% of non-managerial employees receiving performance-related pay within the workplace
Labour turnover	N13	AWIRS derived variable; % voluntary labour turnover
Contracting product market	GB7	Dummy variable=1 if demand for workplace's major product is contracting; otherwise=0
Expanding product market	GB7	Dummy variable=1 if demand for workplace's major product is expanding; otherwise=0
Supervisor training	EA20	Number of first line supervisors (1=none to 4=all) who have undertaken formal training on employee relations
Labour costs (%)	GC1	Labour cost as a % of total costs (less than 20%, 21-40%, 41-60%, 61-80%, more than 80%)
Capacity	GC2	Current operating capacity of workplace (1=lot below full to 3=full)
Non-managerial earnings	EC20	Comparison of non-managerial earnings to other workplaces in the same industry (1=a lot below average to 5=a lot above average)

(continued) →

<b>Union demarcation</b>	UC1	Dummy variable=1 if there has been severe disagreements between unions at the workplace; otherwise=0
<b>Market competition</b>	GB5	Rating of 1 to 6 of the degree of competition for the workplaces' major product or service (1=limited to 6=intense)
<b>Joint consultation</b>	EH1f, EH1g	Whether the workplace has ongoing formal joint consultative committees and/or quality circles or productivity improvement groups (0=no consultation to 2=two forms of consultation)
<b>Use of procedure</b>	EM10	Use of grievance procedure to deal with grievances (1=never to 5=all)
<b>Manual employees (%)</b>	TRAD PLAN LABO EMP	% of manual employees in the workplace [(TRAD + PLAN + LABO) x 100/EMP]
<b>Workplace negotiations</b>	EL1	Dummy variable=1 if management negotiated with union delegates, otherwise=0
<b>Labour productivity</b>	GC12	Comparison of labour productivity with other workplaces in same industry (1=low to 5=high)
<b>Industrial action</b>	EN1, EN2	Dummy variable=1 if industrial action has occurred at the workplace; otherwise=0
<b>Workplace developed procedure</b>	EM9	Dummy variable=1 if procedure is the result of an agreement between management and unions at the workplace; otherwise=0
<b>Skill</b>	PROF PARA TRAD EMP	% Skilled employees in workplace
<b>Tenure</b>	EAS	Length of tenure of industrial relations manager
<b>Share</b>	EC10	Dummy variable=1 if share ownership scheme exists; otherwise=0
<b>Workplace Age</b>	GA3	The length of time workplace has been involved in major activity
<b>Workplace Autonomy</b>	N33	AWIRS derived variable, score between 0 and 100
<b>Job Delegate</b>	EK16	Dummy variable=1 if job delegate exists, otherwise=0

## REFERENCES

- Akerlof, G.A. and Yellen, J.L., (1986) Eds. *Efficiency Wage Models of the Labor Market* Cambridge Uni Press, Cambridge.
- Alexander, M., and Green, R., (1992) *Industrial Relations and Workplace Productivity*, Industrial Relations Research Series, No.2, Department of Industrial Relations, Canberra.
- Australian Council of Trade Unions (ACTU) (1987) *Future Strategies for the Trade Union Movement* Melbourne.
- Benson, J., (1991) *Unions at the Workplace: Shop Steward Leadership and Ideology* Oxford University Press, Melbourne.
- Blanchflower, D., (1986) "What Effect Do Unions Have On Relative Wages in Great Britain" *British Journal of Industrial Relations* 24, 2, pp.195-204.
- Blandy, R., and Brummit, W., (1990) *Labour Productivity and Living Standards* Allen and Unwin, Sydney.
- Blandy, R., Sloan, J., and Wooden, M., (1989) "Reforming the Trade Union Structure in Australia" *Australian Bulletin of Labour* 15, 5, pp.370-383.
- Brown, W., Ebsworth, R., Terry, M., (1978) "Factors Shaping Shop Steward Organisation in Britain" *British Journal of Industrial Relations* 16, 2, pp.139-60.
- Brown, W., Hayles, J., Hughes, B., and Rowe, L., (1984) "Product and Labour Markets in Wage Determination: Some Australian Evidence" *British Journal of Industrial Relations*, 22, 2, pp.169-176.
- Bushe, G.R. (1988) "Developing Co-operative Labor-Management Relations in Unionized Factories: A Multiple Case Study of Quality Circles and Parallel Organizations within Joint Quality of Worklife Projects", *Journal of Applied Behavioural Science*, 22, 1, pp.129-150.
- Business Council of Australia (BCA) (1989) *Enterprise Based Bargaining Units: A Better Way of Working* Melbourne.
- Callus, R., Morehead, A., Cully, M., and Buchanan, J., (1991) *Industrial Relations at Work* AGPS, Canberra.
- Committee of Review into Australian Industrial Relations Law and Systems (1985) (*Hancock Report*), AGPS, Canberra.
- Cotton, J., and Tuttle, J., (1986) "Employee Turnover: A Meta-Analysis and Review with Implications for Research" *Academy of Management Review* January.
- Crockett, G., Dawkins, P., Miller, P., Mulvey, C., (1992) "The Impact of Unions on Workplace Productivity in Australia" *Australian Bulletin of Labour*, June pp.102-124.

- Curtain,R., Gough,R., and Rimmer,M., (1992) *Progress at the Workplace - Workplace Reform and Award Restructuring: An Overview* Department of Industrial Relations, Canberra.
- Daniel,W., (1987) *Workplace Industrial Relations and Technical Change* Francis Pinter, London.
- Dowrick,S., (1990) *Australian Labour Productivity Growth: Trends and Causes* Bureau of Industry Economics, Contributed Paper No.5, Canberra.
- Drago,R., and Wooden, M., (1990) "The Determinants of Strikes in Australia" *Journal of Industrial Relations* 32, 1, pp.32-52.
- Green, R., and McDonald,D., (1991) "The Australian Flexibility Paradox" *Journal of Industrial Relations*, 33, 4, pp.564-585.
- Hill, S. (1991) "How Do You Manage a Flexible Firm? The Total Quality Model" in *Work, Employment and Society*, 5, 3, pp.397-415.
- Horn,H., and Wolinsky,A., (1988) "Worker Substitutability and Patterns of Unionisation" *Economic Journal* 98, pp.484-97.
- Kelly,J., and Heery,E., (1989) "Full-time Officers and Trade Union Recruitment" *British Journal of Industrial Relations*, 27, 2, pp.196-213.
- Kochan,T., and Cappelli,P., (1984) "The Transformation of the Industrial Relations and Personnel Function" in Osterman,P., (ed.) *Internal Labour Markets* MIT Press, Mass.
- Lansbury,R., and McDonald,D., (1992) (eds.) *Workplace Industrial Relations: Australian Case Studies*, Oxford University Press, Melbourne.
- Machin,S., Stewart,M., and van Reenen,J., (1992) *The Economic Effects of Multiple Unionism: Evidence from the 1984 Workplace Industrial Relations Survey* Discussion Paper No.66, Centre for Economic Performance, London School of Economics, London.
- Marginson, P., (1984) "The Distinctive Effects of Plant and Company Size on Workplace Industrial Relations" *British Journal of Industrial Relations* 22, 1, pp.1-14.
- Marginson,P., (1991) "Beyond Size and Sector: A View from Overseas" *Journal of Industrial Relations* 33, 4, pp.586-600.
- Marginson,P., Edwards, P.K., Martin,R., Purcell,J., and Sisson,K., (1988) *Beyond the Workplace: Managing Industrial Relations in the Multi-Establishment Enterprise*, Blackwell, Oxford.
- Marsh, A., (1965) *Industrial Relations in Engineering*, Pergamon, Oxford.
- Nolan, P., and Brown, W.A., (1983) "Competition and Workplace Wage Determination", *Oxford Bulletin of Economics and Statistics* XLV.

- Peetz,D., (1988) *Financial Participation by Employees (1): A Review of Theoretical and Practical Issues*, Department of Industrial Relations, Canberra.
- Peetz,D., (1990) "Declining Union Density" *Journal of Industrial Relations* 32, 2, pp.197-223.
- Rimmer, M. and Underhill, E., (1992) "Paintco" in Lansbury, R. and Macdonald, D., (eds.) *Workplace Industrial Relations: Australian Case Studies*, Oxford University Press, Melbourne, Chapter 3.
- Rimmer, M., (1992) "Current Approaches to Wage Determination at Australian Workplaces" in *National Wages Policy and Workplace Wage Determination - The Critical Issues*, Proceedings of a Conference organised by ACIRRT and The Centre for Economic Policy Research, ANU, ACIRRT Monograph No.7, University of Sydney.
- Rosen,S., (1969) "Trade Union Power, threat effects and the extent of organisation" *Review of Economic Studies* 36, pp.185-196.
- Royal Commission on Trade Unions and Employers' Associations (1968) (*Donovan Report*) Cmnd 3623, London.
- Shorey,J., (1976) "An Inter-industry Analysis of Strike Frequency" *Economica* 43, November, pp.349-65.
- Sloan,J., and Wooden,M., (1990a) *The Structural Efficiency Principle (Award Restructuring) Survey: An Analysis of the Results* Report to the Business Council of Australia and the Business Council of Australia Industrial Relations Study Commission, National Institute of Labour Studies Inc., Flinders University of South Australia.
- Sloan,J., and Wooden,M., (1990b) "The Structural Efficiency Principle in Action - Management Views" *Australian Bulletin of Labour*, 16,3, pp.199-223.
- Smith,C.T.B., Clifton,R., Makeham,P., Creigh,S.W., Burn,R.V., (1978) *Strikes in Britain: A Research Study of Industrial Stoppages in the United Kingdom*, Manpower Paper 15, (UK) Department of Employment, London.
- White,P.J, (1987) "Industrial Relations Procedures" in Towers,B., (ed.) *A Handbook of Industrial Relations Practice: Practice and Law in the Employer Relationship* Kogan Page, London.
- Wilson,N., and Cable,J.R., (1991) "Unions, Wages and Productivity: Some Evidence from UK Engineering Firms", *Applied Economics* 23, Jan., pp.219-27.
- Wooden, M., (1990) "Are Australian Trade Unions Good for Productivity?" *Asia Pacific HRM* 28, 2, pp.81-86.

# Workplace Flexibility: Problems and The Australian Trade Union Movement

Richard Hall and Bill Harley

## INTRODUCTION

Debates concerning the nature and impact of flexibility in the organisation of production which have appeared in the literature on industrial sociology, political economy and labour relations have ranged over a number of issues. However, a topic which has been particularly contentious has been the relationship between flexibility and trade unions.

Two general positions can be identified. The first, associated with the "neo-managerialist" and "neo-Fordist" schools of thought suggests that flexibility poses a very real threat to the continued viability of the trade union movement, and thus that unions should vigorously resist its introduction in Australian workplaces. The second position, labelled by some as "post-Fordist", is much more optimistic and contends that unions should play an active role in the introduction of flexibility as a means to ensure benefits to members and contribute to continuing union influence.

The aim of this paper is to assess the validity of each of these positions. To this end, hypotheses are constructed, and tested using data gathered by the Australian Workplace Industrial Relations Survey (AWIRS).

The paper is divided into four main sections. The following section provides details of the two theoretical approaches to flexibility and of the hypotheses derived from them. Section Three discusses the AWIRS data and the variables which we have constructed. Section Four outlines the methods of analysis employed and the results obtained. In the final section, the implications of the findings will be discussed.

## THEORETICAL BACKGROUND AND HYPOTHESES

A key issue raised in much of the literature on labour flexibility has been the relationship between flexibility and the presence and strength of trade unions in the workplace. Associated with this has been a debate as to the appropriate stance for trade unions to adopt toward the introduction of flexibility. While it has generally

been accepted that significant relationships exist, accounts have differed in terms of the precise nature of the relationships, with two general positions emerging. Those associated with the neo-managerialist and neo-Fordist schools have argued that flexibility is likely to be associated with a diminution of trade union influence. A corollary of this is that trade unions ought to resist strategies aimed at increasing flexibility. Theorists associated with the post-Fordist school have adopted a more optimistic position which suggests that flexibility is consistent with the maintenance or even enhancement of the role of trade unions in the workplace. They suggest that trade unions ought to seek involvement in the introduction of flexibility as a means to ensure positive outcomes. This section of the paper will briefly outline each of these competing positions, in terms of their conceptions of the nature of flexibility and its impact on trade unions. This will allow the generation of two hypotheses which will be tested as a means to shed light on the debate.

The neo-managerialist approach to flexibility is associated with the work of Atkinson and his model of the "flexible firm" (Atkinson 1984, 1985, 1987). The neo-Fordist school is more diverse, but is characterised by a critical neo-marxian analysis of flexibility, and its influence can be found in the work of Boreham (1992), Bramble (1988) and Pollert (1988, 1990) amongst others. The two approaches diverge markedly on a number of dimensions, but share three important features relevant to this discussion. Firstly, their accounts emphasise labour *market* forms of flexibility. Secondly, they perceive flexibility as overwhelmingly being a management controlled phenomenon. Finally, flexibility is seen as posing a significant threat to trade unions.

Labour market flexibility entails phenomena which involve flexibility in the pricing and allocation of labour. Atkinson has identified three main forms: *pay flexibility*; *numerical flexibility*; and *working time flexibility* (1984; 1985; 1987). *Pay flexibility* involves the capacity to vary employees' wage levels to reflect or influence the performance of the individual, or in response to the fortunes of the enterprise. Examples include performance based pay, and linkages of wages to demand for the workplace's product. *Numerical flexibility* involves the capacity to vary labour input to match the needs of the enterprise by altering the numbers of employees according to fluctuations in demand for the workplace's product or service. Atkinson suggests that this is accomplished chiefly by the creation of two groups in the enterprise: a core of full-time permanent employees and a periphery of part-time, casual and contract employees. However, this form of flexibility entails any measures which facilitate the easy variation of staff numbers. Finally, *working time flexibility* also entails variations in labour input, but by varying the hours of work rather than the number of employees. This might be facilitated by, for example, "flexi-time" systems or by the use of short weeks during slow periods. According to neo-managerialist and neo-Fordist theorists, such measures are introduced by managements as a means to keep labour costs as low as possible by ensuring that only the labour necessary at a given time is used, and that it is paid for at the lowest possible rate.

The introduction of these sorts of flexibility strategies are said to have the effect of undermining union strength (Bramble 1988; Bramble and Fieldes 1989; Goodwin and Maconachie 1990; Burgess and Macdonald 1990, 1991; Ewer et al 1991: 38-41; and Boreham and Hall 1992). This approach is exemplified by *Flexibility: Who Needs It?*, a British trade union guide which argues that a central objective of management attempts to introduce greater flexibility in the organisation of production is to marginalise trade unions (CAITS 1986: 29). The argument is

echoed in Australia by Ewer et al, who argue that flexibility is associated with "a new and more sophisticated attempt to demobilise organised labour in the name of economic efficiency...[and the removal of]...meddling and interfering union officials" (1991: 39). This approach suggests that in seeking to introduce greater flexibility in the form of a division of workers into core and peripheral groups, variable pay rates and fluctuating working time, managers explicitly aim to reduce trade union influence, since the implementation of strategies which undermine established working conditions is easier if unions are excluded. Further, once flexible arrangements are in place the shift in the balance of power may be consolidated. Those workers in skilled "core" occupations who have secure employment and relatively high pay are unlikely to feel the need for union protection of their conditions. Those workers in the "periphery" are difficult for unions to organise due to the irregular nature of their employment, and hard to activate due to the precarious nature of their employment. Hence, it is argued, flexibility is easier to introduce in the absence of unions, but even if they are present they are likely to be weakened once flexibility strategies are put in train. Even if managers simply aim to cut costs, as argued by Atkinson, the effect of flexibility is to weaken unions in the ways outlined above (1985). Regardless of management intent, the implication is the same. The thrust of this argument is to suggest that those unionists who embrace flexibility may ultimately be presiding over the demise of their own organisations (Burgess and Macdonald 1990: 53). The association between flexibility and a weakening of unions suggests that it should strongly be resisted.

The post-Fordist school of theory is typified by the work of Piore and Sabel (1984) and Streeck (1987). In Australia it has been vigorously expounded by Mathews (1989a, 1989b) and by Badham and Mathews (1989). This school of theory presents quite a different version of flexibility from that discussed above, and correspondingly different conclusions for the trade union movement. In contrast to the neo-Fordist and neo-managerialist analyses, post-Fordist theory emphasises labour *process* forms of flexibility. That is, it is concerned not with the allocation and pricing of labour, but with the processes by which decisions are made and labour expended in producing goods and services.

Four forms of labour process flexibility are relevant to this discussion: *functional flexibility* (Atkinson 1984, 1985, 1987), *technical-organisational flexibility* (Meulders and Wilkin 1987), *product innovation* (Badham and Mathews 1989) and *procedural flexibility* (Rimmer and Zappala 1988). *Functional flexibility* refers to strategies aimed at increasing the range of tasks which a given worker can perform via, for example multiskilling and the removal of strict demarcations between different job classifications. It is said to increase flexibility in that highly trained and adaptable workers can quickly change tasks depending on the needs of the production process. *Technical-organisational flexibility* involves the integration of flexible computerised equipment with new flexible management techniques and forms of work organisation to produce a workplace with the capacity to quickly be reorganised to produce the commodities demanded by the market at a particular time. *Product innovation* is the ability to switch between products and devise new ones as demand changes. Finally, *procedural flexibility* refers to flexibility in the mechanisms by which changes in how the workplace or enterprise operates are brought about.

Rather than stressing managerial prerogative to control the implementation and operation of mechanisms to facilitate flexibility, post-Fordist theory suggests that maximal labour process flexibility will only be realised if there is worker input. It is

argued that if workers are to deploy their skills using new technologies, and contribute to innovation in terms of new products and new ways of organising production, then they must be afforded an active role in running enterprises. Streeck argues that "industrial recovery can only be achieved with the workforce and not against them" (1987: 298), and Mathews contends that successful approaches to the implementation of flexibility will be

based on the mutual advantages that both labour and capital derive from a productive and efficient enterprise that is grounded in respect for human skill and ingenuity. It abandons a model of adversarial relations in favour of co-operation (Mathews 1989a: 146).

Post-Fordist theory suggests that there will exist a new basis for a mutuality of interests between workers and management, based on a shared interest in the pursuit of flexible forms of production (Wood 1989: 18), and that this will be manifested as more harmonious and co-operative relations between labour and capital.

This position has two implications for trade unions. The first is that, since the post-Fordist version of flexibility stresses skills, rewarding work and participation, unions seem likely to encourage this sort of flexibility as a means to protect their members' interests. That is, the presence of unions in an enterprise or workplace may be associated with a tendency to adopt post-Fordist strategies rather than neo-managerialist or neo-Fordist ones. The second implication is that the adoption of the post-Fordist variant of flexibility may lead to a strengthening of the position of trade unions. Since worker co-operation and input is a necessary part of the post-Fordist vision, some sort of co-ordinating mechanism would appear to be necessary. To the extent that unions are able to perform this role, and thus to co-operate with management in the pursuit of a flexible and productive workplace, their role in production ought to be enhanced. From this perspective, the trade union movement should not reject flexibility, but rather should ensure that unions are involved in the implementation of flexibility of the sort envisaged by post-Fordist theory. This is because post-Fordist theory suggests that the trade union movement can have a role in determining the way in which flexibility is introduced, and that flexibility is likely to have positive outcomes for trade unions.

The two perspectives presented here provide quite different views of the implications of flexibility for trade unions. The position informed by neo-managerialism and neo-Fordism suggests that flexibility is bad for unions, while the post-Fordist position is that, potentially at least, it is good. Since the purpose of this paper is to clarify the relationships between flexibility and the presence and strength of trade unions it is necessary to submit the propositions of the two perspectives to testing. This suggests the need to generate hypotheses which can be tested using the AWIRS data. Two hypotheses can be generated, as follows:

*Post-Fordism:* There is likely to be a positive association between the presence of trade unions and the level of union membership in a workplace and the presence of forms of labour process flexibility, especially those which emphasise worker input to control of the production process.

*Neo-managerialism/Neo-Fordism:* There is likely to be a negative association between the presence of trade unions and the level of union membership in a workplace and the presence of forms of labour market flexibility, especially those

which emphasise management control over the pricing, volume and timing of labour input.

Two points must be made concerning the hypotheses. Firstly, they are not competing hypotheses. It is quite plausible that both are correct since, while each proposes a different outcome for unions, each outcome is associated with a different version of flexibility. Secondly, the hypotheses say nothing about direction of causality. Because each of the perspectives allows that flexibility may be either a cause or an effect of union presence and strength the hypotheses concern only association and not causation.

The aim of this section of the paper has been to outline two perspectives on the relationship between flexibility and trade unions, and their implications for union approaches to the introduction of flexibility. It has been shown that the neo-managerialist/neo-Fordist theory proposes that management initiated and controlled labour market flexibility appears to be associated with threats to union viability. Conversely, post-Fordist theory emphasises worker participation in the introduction of labour process flexibility and suggests that this can be associated with a strengthening of the role of trade unions in the workplace. Two hypotheses have been generated, each reflecting one of these positions. In the next section of the paper details will be provided of how the AWIRS data has been employed to test the hypotheses.

## DATA AND VARIABLES

The AWIRS consisted of two surveys. This paper utilises data from the larger of the two, which was administered between October 1989 and May 1990, covered 2004 workplaces with a minimum of twenty employees in all states and territories, and included all industries with the exceptions of agriculture and defence. The survey oversampled very large workplaces, reflecting the fact that the majority of employees in Australia are employed in a small number of such workplaces. However, the data used in this project has been weighted to account for this factor. This, and the fact that the sample size is sufficiently large, mean that results from analysis of the data can be treated as indicative of Australian workplaces as a whole with a reasonable degree of confidence. For a detailed account of the survey method and results, see *Industrial Relations at Work: The Australian Workplace Industrial Relations Survey* (Callus et al 1991).

As a means to test the hypotheses presented in Section Two, a series of indicators of flexibility was constructed to be used as independent variables, as well as two indicators of unionisation to be used as dependent variables. Where possible the independent variables encompass both worker and management controlled forms of flexibility to reflect this important dimension on which forms of flexibility diverge. Full details of construction of all variables can be obtained from the authors on request. Details of the statistical methods used to test the hypotheses are provided in Section Four, which reports the results of the analysis.

*NUMFLEX1* (Numerical Flexibility for Management) measures the extent to which management would seek to vary staff numbers in response to changes in demand. It has a range from 0, indicating that no variations would take place, to 4, indicating that staff numbers would be varied in response to both long and short-term

increases and decreases in demand. *NUMFLEX2* (Core/Periphery) provides a measure of the extent to which workers are divided into a core and a periphery within the workplace, based on relative proportions of full-time permanent, part-time permanent, full-time casual, part-time casual, temporary, agency workers, and outworkers. This variable has a range from 100, which indicates that the workplace employs one-hundred per cent full-time permanent employees to 800, which indicates that the workplace employs only temporary workers, contract workers and/or outworkers. *NUMFLEX3* (Employment Security) measures the degree of employment security offered to workers. It is a dichotomous dummy variable where a value of 1 indicates that workers are not offered security as a condition of employment and a value of 0 indicates that they are offered security.

A series of variables was also constructed to capture the use of variable working time. *WTFLEX1* (Working Time Flexibility for Workers) is a measure of the extent to which workers have flexibility in determining the hours they work. It has a range from 3, indicating that workers set their own starting and finishing times to 1, indicating that working time is determined solely by management. *WTFLEX2* (Working Time Flexibility for Management) measures the extent to which managements seek to vary workers hours in response to changes in demand for products or services. Like *NUMFLEX1*, this variable has a range from 0 to 4, where the former indicates that this form of flexibility is not employed in response to changes in demand, and the latter that it is used to respond to both long-term and short-term increases and decreases in demand.

*FUNFLEX1* (Flexibility for Workers) measures the degree of flexibility which workers have in determining how they do their work. This variable has a range from 0 to 15, the former indicating that workers had no control over how work is allocated to them, the pace at which they work or how they do their job, and the latter indicating complete control over each of these aspects of work. It was not possible to generate a variable which unequivocally indicated management-controlled functional flexibility, but *FUNFLEX2* (Flexible Management Techniques) measures the extent of introduction of management practices associated with a range of more flexible forms of work organisation which could facilitate *either* worker or management controlled functional flexibility. *FUNFLEX2* has a range from 0, indicating that none of the forms were present, to 3, indicating that all were.

Three variables were constructed to measure pay flexibility. *PAYFLEX1* (Pay Flexibility for Management) measures the extent to which managers would seek to vary pay in response to changes in demand for product or service. This variable has a scale from 0 to 4, which is analogous to those for *NUMFLEX1* and *WTFLEX2*. *PAYFLEX2* (Over Award Pay) measures the extent to which managements pay above the legally required minimum rate to attract staff, and is simply the percentage of workers paid on this basis in the pay period prior to the survey. *PAYFLEX3* (Performance-Based Pay) is a measure of the extent to which pay is linked to performance, and again is simply the percentage of workers paid on this basis.

*PRCFLEX1* (Consultative Committees) measures the extent of use of consultative mechanisms in the workplace. It has a three-point scale, where 0 indicates that the workplace has no formal consultative mechanism and 2 indicates that it has such a mechanism and that it is used to increase the flexibility of the workplace. It should be noted that the questionnaire items from which this variable was constructed

included all forms of consultative committees regardless of the existence of unions in the workplace.

*TECFLEX1* (Technical-Organisational Flexibility) is a measure of the usage of computerised technologies and associated flexible forms of management and work organisation as a means to enhance product quality, product distinctiveness or responsiveness to customer requirements, and has a range from 0 to 2. *PRDFLEX1* (Product Innovation) is a measure of the ability to vary the product or service provided by the workplace. It is a dichotomous dummy variable, where a value of 1 indicates that there has been a major change in product or service produced by the workplace in the two years prior to the survey, and 0 indicates the absence of any such change.

Since it seemed likely that a number of factors would have an impact on flexibility and/or unionisation, control variables which capture important intervening factors were included. They were: *INDUSTRY*, a series of dichotomous dummy variables based on the ASIC Industry Divisions; *SECTOR*, a dichotomous dummy variable where a value of 0 indicates public sector and 1 indicates private sector; and *SIZE* which is simply a measure of the number of employees at the workplace.

Two variables were included to capture patterns of unionisation. *UNDUM* (Union or Non-Union) is a measure of the presence or absence of unions in each workplace. It is constructed as a dichotomous dummy variable for which a value of 0 indicates that no union has members at the workplace. *UNDEN* (Union Density) is a measure of unionisation of non-managerial staff. It is based on an estimate by managers of the rate of union membership in the workplace and is expressed as a percentage of all non-managerial employees.

As noted earlier in the section, the AWIRS oversampled large workplaces. Some industry groups were also oversampled. This was done to with the aim of producing estimates with similar levels of precision in different sub-groups of the data when stratified by employment size or industry group (Callus et al, 1991: 219). All analysis has been weighted to compensate for this.

An important limitation applies to the findings of this study and should be made clear. This is that, as noted above, this study only utilises data for workplaces with 20 or more employees. This means that it excludes the 75 per cent of all workplaces with 5 to 19 employees (Callus et al 1991: 18-19), and in this sense is unrepresentative of small workplaces. While around 77 per cent of employees work in workplaces with 20 or more employees (Callus et al 1991: 18-19), by using this sample over 20 per cent of employees are excluded. Claims made in this study are based on data applicable to the bulk of *employees*, but not necessarily to the majority of *workplaces*.

#### SECTION FOUR: RESULTS

This section reports the results of our analysis of the relations between various forms of flexibility and workplace unionisation utilising the AWIRS data. This analysis serves to test the hypotheses specified earlier. The results of the analysis provide broad support for both the principal hypotheses. First, the forms of flexibility consistent with a post-Fordist model of work organisation, in particular, functional and procedural flexibility, are associated with the presence rather than

absence of unions and with higher rather than lower rates of unionisation. Second, the prevalence of those forms of labour market flexibility that suggest the continuity of more traditional strategies of managerial control over the deployment of labour, numerical and pay flexibility, emerge as being associated more strongly with the absence of unions and lower rates of union membership at the workplace. The results indicate qualified and preliminary support for arguments that unions have been able to resist some of the effects of management attempts to extend "peripheral" employment conditions associated with numerical and pay flexibility as well as for arguments that unions facilitate rather than hinder the introduction of flexible work arrangements that involve more profound changes to the organisation of production and demand the participation of labour at the workplace.

Alternatively, the results also caution against assertions that all forms of flexibility are necessarily detrimental to the role of unions at the workplace level. While there is support for the neo-Fordist theses that see the extension of numerical and pay flexibility arrangements as potentially damaging to unionism, the introduction of functional and procedural flexibility is indeed consistent with, and may even be enhanced by, the presence of unions and reasonably high rates of unionisation.

As noted in the previous section, the data analysis undertaken involved the construction of variables designed to measure, on the one hand, various forms of flexibility, and, on the other, the presence or absence of unions at the workplace as well as an approximation of the rate of unionisation. Correlation coefficients measuring the strength of the association between each of the flexibility variables and the two unionisation variables were examined and, on the basis of that assessment, those flexibility variables that emerged as significant were further analysed through crosstabulation with both the unionisation variables. Finally, in order to confirm the integrity of the observed bivariate relations between flexibility and unionisation, the influence of other variables thought to be strongly associated with either unions or flexibility was investigated through simple multivariate techniques. The following is divided into four sections: the first reports the results of the correlation procedure; the second presents the results of the crosstabulation of the labour market flexibility variables with the unionisation measures; the third reports the results of the crosstabulations involving the labour process flexibility variables; and, the fourth reports the results of analyses that incorporate the influence of other potentially relevant variables.

### **The Associations between Flexibility and Unionisation**

The correlation coefficients for the relation between each of the flexibility variables and the two unionisation variables are reported in Table 1. A number of other variables measuring flexibility, which were originally included in the correlation analysis, have not been included as the coefficients were not statistically significant at the 0.05 level.

Generally the associations between our measures of flexibility and the unionisation variables are very weak. None of the flexibility variables are able to explain more than a very small proportion of the variance in the presence or absence of unions or in the approximate rate of unionisation; alternatively, the extent of unionisation can account for only a small proportion of the differences between workplaces in terms of their flexibility. Nevertheless, as indicated in Table 1, ten of the correlations

**TABLE 1: CORRELATIONS OF UNIONISATION AND FLEXIBILITY**

<b>Flexibility Variable</b>	<b>UNDUM</b>	<b>UNDEN</b>
<b>NUMFLEX 2</b>	-0.16	-0.10
	0.0001	0.0001
	1728	1695
<b>NUMFLEX 3</b>	-0.13	-0.13
	0.0001	0.0001
	1995	1705
<b>PAYFLEX 1</b>	-0.07	-0.03
	0.0013	0.2768
	1995	1705
<b>PAYFLEX 2</b>	-0.23	-0.26
	0.0001	0.0001
	1376	1196
<b>PAYFLEX 3</b>	-0.10	-0.07
	0.0001	0.0038
	1989	1702
<b>WTFLEX 1</b>	-0.09	-0.13
	0.0001	0.0001
	1995	1705
<b>FUNFLEX 3</b>	0.07	0.04
	0.0018	0.0797
	1995	1705
<b>PRDFLEX 1</b>	0.06	0.03
	0.0133	0.2198
	1994	1705
<b>PRCFLEX 1</b>	0.14	0.13
	0.0001	0.0001
	1995	1705
<b>TECFLEX 1</b>	-0.12	-0.13
	0.0001	0.0001
	1995	1705

NB: Pearson's R / T Statistic / Number of Cases  
 UNDEN and NUMFLEX3 weight = SCQ otherwise weight = GMQ

emerge as statistically significant and, despite their small coefficients, were regarded as worthy of further analysis.

The variable measuring the incidence of pay flexibility in the form of over-award payments (PAYFLEX2) emerged as the flexibility variable with the strongest association with unionisation. All three pay flexibility variables are negatively correlated with both unionisation measures. Similarly, all three numerical flexibility variables are negatively (and weakly) associated with unionisation. Unionisation also has a negative association with the variables constructed so as to capture the incidence of working time flexibility for workers (WTFLEX1) and technical-organisational flexibility (TECFLEX1). Thus, these forms of flexibility - pay, numerical, working time and technical-organisational flexibility - are less likely to occur, or are less likely to be highly developed, where unions are present and where the rate of unionisation is higher rather than lower.

Other forms of flexibility are, however, positively associated with unionisation. The functional flexibility variable, measuring the extent to which workplaces had introduced structures facilitating worker participation in production or labour process reorganisation (FUNFLEX2), and the product flexibility variable, estimating the incidence of major product changes in the preceding two years, were both positively if very weakly correlated with unionisation. More notably, the measure of procedural flexibility, indicating the presence and utilisation of formal mechanisms through which employees are involved in workplace change (PRCFLEX1), is positively associated with the presence and relative strength of unionisation at the workplace.

### **Unionisation and Labour Market Flexibility**

The crosstabulation of each of the relevant flexibility variables with both of the unionisation variables was undertaken in order to further illuminate the relations between the pursuit of different forms of flexibility and workplace unionisation in Australia. Regarding the unionisation variables, principal reference is made to the dichotomous dummy variable measuring the presence or absence of a union (or unions) at the workplace (UNDUM) while attention is drawn to the interval level variable approximating workplace union density (UNDEN) where significant trends are apparent. As might be expected there is a high level of correlation ( $r = 0.73^{***}$ ) between the two unionisation variables.

Crosstabulation enables the general bivariate relations expressed by the correlation coefficients to be brought into sharper focus. While correlations indicate the broad strength of the association between two given variables for all values of those variables, the crosstabulation of variables where their values are meaningfully grouped can assist in identifying the 'critical ranges' of variables where their association with changes in the other variable are most pronounced and substantively important.

### **Numerical Flexibility**

The variable NUMFLEX2 provides a measure of the extent to which a particular workplace employs staff on a flexible basis through the utilisation of part-time,

casual and temporary arrangements as well as through the use of outworkers and agency and contract workers. In the construction of this variable the proportions of employee categories have been weighted such that a score of 100 indicates that all employees are employed on a full-time permanent basis while higher scores indicate progressively higher proportions of employees employed under more flexible conditions.

**TABLE 2: NUMFLEX2 (CORE/PERIPHERY) BY UNDUM**

	100	101-199	200-499	500-799	TOTAL
<b>NON-UNION</b>	10.9	38.1	32.0	18.9	18.9
	20.8	14.5	17.8	52.7	
	622	2177	1828	1080	5706
<b>UNION</b>	9.6	52.1	34.3	3.9	81.2
	79.2	85.5	82.2	47.3	
	2367	12800	8428	969	24565
<b>TOTAL</b>	9.9	49.5	33.9	6.8	100
	2989	14977	10256	2049	30271

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

Table 2 shows the crosstabulation of union presence with this measure of flexibility. Generally, non-unionised workplaces have higher levels of numerical flexibility than unionised workplaces. While approximately 51% of non-unionised workplaces have a score of at least 200 on this scale, just over 38% of unionised workplaces have the same degree of flexibility. This trend is more pronounced at the highest levels of numerical flexibility: just under 19% of non-unionised places compared with approximately 4% of unionised workplaces are highly flexible, that is, with scores of at least 500. This finding offers provisional support for the argument that unions have, to some extent, been successful in resisting the casualisation of employment conditions and for the alternative argument that relatively casualised workplaces, where numerical flexibility is achieved through a comparatively high proportion of part-time, casual, temporary and contract workers, are less conducive to union organisation than more traditional workplaces that have generally full-time, permanent staff structures.

A similar, if more pronounced finding is suggested by Table 3 which shows the crosstabulation of union presence or absence with the presence or absence of employer guarantees as to job security.

TABLE 3: NUMFLEX3 (EMPLOYMENT SECURITY) BY UNDUM

	LOW	HIGH	TOTAL
NON-UNION	51.9 15.9 3100	48.0 26.6 2866	19.7  5966
UNION	67.5 84.1 16438	32.5 73.4 7927	80.3  24364
TOTAL	64.4 19538	35.6 10793	100 30331

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

While over two-thirds of workplaces where a union is present provide for some employment security for their employees, just over half of non-unionised workplaces do so. On this measure of numerical flexibility, non-unionised workplaces again emerge as slightly more flexible than unionised workplaces.

The observed trend of greater numerical flexibility in non-unionised than unionised workplaces does not imply however that numerical flexibility steadily decreases as the rate of unionisation increases. Inspection of the crosstabulation of the numerical flexibility variables with our measure of union density (UNDEN) indicated that the lowest levels of numerical flexibility tended to occur in those workplaces with moderate to high unionisation (50-90%) rather than in those with very high estimated rates of unionisation (>90%).

### *Pay Flexibility*

Our analysis indicates that, like numerical flexibility, pay flexibility tends to be weakly associated with the absence rather than the presence of unions. The first of the three payment flexibility variables considered in this analysis, PAYFLEX1, provides a measure of the propensity of workplace managers to respond to short and long term changes in business by increasing or decreasing employee pay.

While resort to this form of pay flexibility is exceedingly rare, with only 3% of all workplaces ever choosing this as an option, it is somewhat more common amongst non-unionised workplaces than unionised ones. As suggested by the lack of a statistically significant correlation between this variable and the union density variable reported in Table 1, however, there is no clear linear relationship between increasing union density and the likelihood of managers utilising this form of flexibility.

**TABLE 4: PAYFLEX1 (PAY FLEXIBILITY FOR MANAGEMENT) BY UNDUM**

	NONE	SOME	TOTAL
<b>NON-UNION</b>	94.2 19.1 5619	5.8 38.38 347	19.7 5966
<b>UNION</b>	97.7 80.9 23808	2.3 61.6 557	80.3 24364
<b>TOTAL</b>	97.0 29427	3.0 904	100 30330

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

Out of all the flexibility variables analysed, PAYFLEX2 is the most strongly associated with both the union variables. PAYFLEX2 measures the percentage of employees receiving over-award payments as a means of attracting or retaining them.

**TABLE 5: PAYFLEX2 (OVER-AWARD) BY UNDUM**

	NONE	UP TO 25%	OVER 25%	TOTAL
<b>NON-UNION</b>	50.4 12.0 1760	4.1 8.9 141	45.5 33.8 1589	16.7 3491
<b>UNION</b>	73.9 88.0 12887	8.3 91.1 1449	17.8 66.2 3107	83.3 17443
<b>TOTAL</b>	70.0 14648	7.6 1591	22.4 4695	100 20933

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

While almost one half of all non-unionised workplaces have at least some employees receiving over-award payments, little more than a quarter of unionised workplaces use such strategies. The extent of the use of over-award payments within individual workplaces is also much greater in the non-unionised sector. More than 45% of those workplaces claim to pay at least a quarter of their

employees more than the rate specified by the relevant award, while only 18% of unionised workplaces make such payments to at least a quarter of their employees. Moreover the crosstabulation of this variable with UNDEN indicates that the greater the proportion of employees unionised, the lower the proportion receiving over-award payments. These findings can be interpreted in three ways. First, it might be the case that where they are present (and stronger rather than weaker) at workplaces unions have been able to secure particular workplace specific or non-award benefits for employees that reduce the need for over-award payments or the willingness of employers to provide such payments. Second, higher rates of workplace unionisation suggest a degree of solidarity amongst employees that militates against the capacity of employers to isolate a core of employees as the beneficiaries of over-award payments. In such enterprises the provision of such payments would be more likely to flow on more quickly to all employees, under the influence of union campaigning. Third, it might be the case that workplaces in which over-award payment is common provide less hospitable environments for the cultivation of unionism. Employees in those workplaces may see less relevance in union membership when they receive payments in excess of the rates specified in the union negotiated award.

A similar, if less striking and consistent pattern emerges with respect to the incidence of performance related pay. The absence of performance related methods of payment is more common in unionised workplaces (71.0%) than in non-unionised places (58.9%). As Table 6 shows, while over 40% of non-union workplaces use performance related pay systems for at least a quarter of their employees less than 30% of unionised places do so. While the presence or absence of unions appears more important to the incidence of performance related pay than the level of unionisation, workplaces tend to divide between those where at least a quarter of the employees are unionised and those where less than a quarter are members; workplaces in the former category tend to be rather more resistant to the use of performance pay than workplaces in the latter category irrespective of the particular level of unionisation.

**TABLE 6: PAYFLEX3 (PERFORMANCE-BASED PAY) BY UNDEM**

	NONE	UP TO 25%	OVER 25%	TOTAL
<b>NON-UNION</b>	58.9 16.9 3514	22.0 25.7 1312	19.1 26.0 1140	19.7  5966
<b>UNION</b>	71.0 83.1 17253	15.6 74.3 3792	13.4 74.0 3243	80.3  24288
<b>TOTAL</b>	68.6 20766	16.9 5105	14.5 4383	100 30253

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

### Working Time Flexibility

Only one measure of working time flexibility emerged as being systematically related to unionisation. WTFLEX1 indicates the extent to which employees are able to determine their own work starting and finishing times. Non-unionised workplaces are somewhat more likely to allow employees in the largest occupational group to either determine their own starting and finishing times (high flexibility) or influence those times (medium flexibility). Hours of work are, of course, one of the traditional areas of negotiation common to union-employer bargaining and award regulation and a higher degree of regulation of working time would be expected in workplaces where union members are employed. Nevertheless, the differences between the two classes of workplaces is not great: more than a third of unionised workplaces permit their employees to influence or determine their starting times compared with 43% of non-unionised workplaces.

**TABLE 7: WTFLEX1 (WORKING TIME FLEXIBILITY FOR WORKERS) BY UNDUM**

	LOW	MEDIUM	HIGH	TOTAL
<b>NON-UNION</b>	57.0 17.8 3399	33.4 20.4 1991	9.7 38.8 576	19.7  5966
<b>UNION</b>	64.3 82.2 15673	31.9 79.6 7781	3.7 61.2 910	80.3  24364
<b>TOTAL</b>	62.9 19072	32.2 9772	4.9 1486	100 30331

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

Other research has indicated that, despite the claims and predictions made by post-Fordist theories, control and influence over day-to-day work decisions (such as starting and finishing times) remains largely restricted to employees at the higher levels of occupational hierarchies (Boreham and Hall 1992). The finding here appears consistent with that research: workplaces that employ a proportionately high number of workers of high occupational status, and thus reveal higher levels of working time discretion amongst their most common occupational group, are more likely to be non-unionised. Higher levels of unionisation tend to be associated with lower levels of this form of working time flexibility, however the pattern is less than uniform. Inspection of the crosstabulation of this variable with our density variable indicates that, for example, non-unionised workplaces are only marginally more likely to provide medium or high flexibility (43% of those workplaces) than workplaces with an estimated level of unionisation between 50% and 75% (42% of those workplaces). It is difficult therefore to interpret this finding as supporting arguments that depict the presence of unions as an obstacle to the

introduction of working time flexibility for workers. Moreover no association was discovered between a measure of working time flexibility for management and either of the unionisation variables.

### Unionisation and Labour Process Flexibility

This section discusses the relations between unionisation and a number of forms of flexibility that are often suggested to be critically related to the capacity of enterprises to successfully introduce significant changes to the products or services they make or provide. While the forms of labour market flexibility discussed in the previous section (numerical, pay and working time flexibility) can be introduced (or sustained) without significant changes occurring in the product or service central to the purpose of the enterprise, the forms of labour process flexibility considered here tend to strike at the relations between production or service changes and changes in the skills of employees, in the organisation of the labour process and in the decision making procedures associated with workplace change. As such these forms of flexibility offer the possibility of enhanced levels of worker participation, skill development and influence over the labour process.

### Functional Flexibility

For the purposes of this analysis some degree of functional flexibility in a particular workplace is assumed to be indicated by the introduction by management of job redesign, semi-autonomous work groups or quality circles. FUNFLEX2 provides a measure of the extent to which such strategies had been introduced in the previous five years.

**TABLE 8: FUNFLEX2 (FLEXIBLE MANAGEMENT TECHNIQUES) BY UNDUM**

	NONE	LOW	MED	HIGH	TOTAL
<b>NON-UNION</b>	53.2 22.0 3175	29.9 19.0 1784	13.7 17.1 815	3.2 11.0 192	19.7 5966
<b>UNION</b>	46.1 78.0 11242	31.2 81.0 7610	16.3 82.9 3964	6.4 89.0 1548	80.3 24364
<b>TOTAL</b>	47.5 14417	31.0 9394	15.6 4779	5.7 1741	100 30331

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

Table 8 shows that the implementation of these strategies designed to enhance functional flexibility is slightly more common in unionised workplaces than in non-unionised ones. While the incidence of the implementation of all three strategies is generally very rare, approximately twice the proportion of unionised workplaces (6.4%) than non-unionised workplaces (3.2%) achieved this high level of functional flexibility. This finding suggests that the introduction of redesigned jobs, work groups and quality circles is enhanced rather than inhibited by the presence of unions.

### **Product Flexibility**

As noted above, the forms of flexibility discussed in this section are related to, amongst other things, the capacity of a workplace to undertake and manage fundamental changes to the operational purpose of the enterprise. Our variable measuring product flexibility (PRDFLEX1) measures the proportion of workplaces where a major change in product or service was undertaken within the last two years.

**TABLE 9: PRDFLEX1 (PRODUCT INNOVATION) BY UNDUM**

	NO CHANGE	CHANGE	TOTAL
<b>NON-UNION</b>	87.5 20.7 5221	12.5 14.8 746	19.7  5966
<b>UNION</b>	82.3 79.3 20023	14.2 85.2 4304	80.3  24326
<b>TOTAL</b>	83.3 25243	16.7 5049	100 30292

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

While only one in six workplaces had undertaken such a change in the preceding two years, the propensity to change was somewhat greater in unionised than in non-unionised workplaces. Again, there is no evidence that the presence of unionists inhibits the introduction of significant change, nor that a workplace environment prone to substantial change is inimical to union presence. There is, however, no apparent statistical relation between the *extent* of unionisation and the introduction of product or service changes.

### *Procedural Flexibility*

Given this finding it was thought necessary to consider more closely the means by which workplace change was introduced in both unionised and non-unionised workplaces. A measure of procedural flexibility was constructed so as to capture the extent to which workplace change might be facilitated through the use of formal and ongoing joint consultative committees. PRCFLEX1 is grouped such that "low" flexibility indicates the absence of any ongoing and formal joint consultative committee, "medium" indicates that such a committee exists and "high" indicates that the most important objectives of that committee concern the provision of assistance in the implementation of change or the introduction of new technology. While this form of procedural flexibility is again very rare, it is much more likely amongst unionised than non-unionised workplaces.

**TABLE 10: PRCFLEX1 (CONSULTATIVE COMMITTEES) BY UNDUM**

	LOW	MEDIUM	HIGH	TOTAL
<b>NON-UNION</b>	96.3 22.1 5745	3.0 5.8 176	0.8 3.4 45	19.7 5966
<b>UNION</b>	83.0 77.9 20226	11.8 94.2 2862	5.2 96.6 1276	80.3 24364
<b>TOTAL</b>	85.6 25971	10.0 3038	4.4 1320	100 30331

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

As shown in Table 10 the proportion of unionised workplaces with joint consultative committees is almost five times that of non-unionised workplaces.

Although the incidence of procedural flexibility in Australian workplaces is very low it is apparent that the presence of unions is, if anything, conducive to the implementation of change and to the involvement of workers, or their representatives, in the process of that change. Unionised workplaces are more likely than non-unionised workplaces to have structures that might facilitate employee influence over the course of workplace change.

### *Technical-Organisational Flexibility*

The final measure of flexibility considered in this analysis concerns the extent to which managers of workplaces where quality, customer responsiveness or product distinctiveness is considered crucial to success have introduced new production and management strategies such as total quality control (TQM), computer integrated management (CIM) or "just in time" (JIT). The variable TECFLEX1 indicates the number of such strategies introduced in particular workplaces.

**TABLE 11: TECFLEX1 (TECHNICAL-ORGANISATIONAL FLEXIBILITY) BY UNDUM**

	LOW	MEDIUM	HIGH	TOTAL
<b>NON-UNION</b>	58.7 16.6 3504	4.2 20.3 252	37.1 27.7 2211	19.7  5966
<b>UNION</b>	72.3 83.4 17603	4.1 79.8 992	23.7 72.3 5769	80.3  24364
<b>TOTAL</b>	69.6 21107	4.1 1244	26.3 7980	100 30331

NB: Row percent / Column percent / Number of Cases  
Total discrepancies due to rounding

As shown by Table 11, the three elements of this operationalisation of technical-organisational flexibility (TQM, CIM and JIT) tend to be introduced together if at all: only 4% of the sample had introduced one or two of the techniques (medium) while 26% had introduced all three (high). Secondly, high levels of technical-organisational flexibility are more likely in non-unionised workplaces than in unionised workplaces. Just over a third of non-unionised places and just under a quarter of unionised workplaces had introduced all three techniques. This variable then is unique in this group of flexibility variables in that it is more likely where unions are absent rather than present. Nevertheless this trend is less than clear. Although technical-organisational flexibility tends to decrease as unionisation increases this does not hold for those workplaces that have some but less than 25% of their employees unionised. The incidence of high levels of flexibility is actually more common amongst that group of lowly unionised workplaces (40.9%) than amongst those that have no union members (37.1%).

Nevertheless, unions are generally associated with lower levels of this measure of flexibility. In accounting for this finding the contentious nature of management strategies such as TQM, CIM and JIT must be recognised. Neo-Fordist theories would suggest that these strategies are associated with an increase in managerial control over the labour process and represent a further marginalisation of the influence of labour at the workplace. It may be the case that unions have sought to delay or impede the introduction of such strategies through their participation in the structures at the workplace that are designed to facilitate procedural flexibility.

### **Unionisation, Flexibility and the Effects of Sector and Industry**

The results presented here attest to a number of distinctive relations between unionisation and flexibility in Australian industry. However, consideration of the AWIRS data also suggests that these relations are likely to be influenced by other factors. In particular, previous research conducted by the authors and others (Bamber, Boreham and Harley 1992) indicates that the incidence of the forms of flexibility measured here are associated with various sector, industry and workplace

size characteristics. Moreover those characteristics are in turn associated with particular patterns of unionisation. It would be possible therefore that the observed relations between unionisation and flexibility reported here are simply an artefact of the relations between those other workplace characteristics and flexibility.

In order to investigate the relative influence of these other variables in the relations between unionisation and flexibility multivariate analysis of the data was undertaken. For the purposes of this analysis the causal assumption was made that unionisation effected flexibility; the flexibility variables were therefore regarded as dependent variables. As noted above, our previous analysis of the data led us to suspect that sector (public/private), industry sector and size would be associated with flexibility. This suggested a structural equation model of the form:

$$\text{FLEXIBILITY} = \text{UNDUM} + \text{SECTOR} + \text{SIZE} + \text{INDUSTRY} + e$$

where INDUSTRY is a series of dichotomous dummy variables for each of the ASIC industry groups (less one). In turn each of the flexibility variables was regressed on the 12 independent variables. All of the structural equation models performed poorly with none of the models explaining more than a small proportion of the variance. In most instances none (or very few) of the independent variables emerged as statistically significant and, where they did, their regression coefficients were very small. Modelling product flexibility (PRDFLEX1) provided one of the few examples where statistically significant associations emerged.

**TABLE 12: REGRESSION OF PRDFLEX1 (PRODUCT INNOVATION)**

INDEPENDENT VAR	REG COEFFICIENT	SIGNIFICANCE
INTERCEPT	-0.00	0.991
UNDUM	0.06	0.006
SECTOR	-0.01	0.807
SIZE	0.00	0.910
MANUFA	0.14	0.070
ELECTR	-0.05	0.621
CONSTR	0.02	0.849
WHOLES	0.09	0.280
TRANSP	0.12	0.176
COMMUN	0.19	0.046
FINANC	0.23	0.005
PUBLIC	0.10	0.273
COMSER	0.12	0.145
RECREA	0.12	0.127

Adjusted R-square      0.02

N (weighted)            1994

NB: PRDFLEX1 has a range from 0 to 1.

As Table 12 shows, none of the three statistically significant independent variables exert much influence on product flexibility. Nevertheless for present purposes it can

be seen that even when the effects of a large number of variables are controlled for the presence or absence of a union (UNDUM) retains its influence. Evidently as a model of flexibility the above model is not correctly specified. Models were re-run retaining only those independent variables that were statistically significant. The results provided a similar pattern: typically, regression coefficients were small, however UNDUM normally retained its influence and the sign of its coefficient was invariably in the expected direction. SECTOR and some of the INDUSTRY variables were statistically significant in a number of cases however SIZE was not. The SIZE variable was therefore omitted from subsequent analyses. While unionisation is clearly a poor predictor of flexibility it is nevertheless associated with flexibility and this association is maintained even when a considerable number of other variables are controlled for.

The integrity of the relations between unionisation and flexibility' even when the effects of sector and industry are included in the analysis, is perhaps more easily demonstrated by three and four-way crosstabulations. The crosstabulations of each of the flexibility variables with the union presence variable were conducted for public and private sector workplaces and then compared. Generally the positive associations between the presence of unions and labour process flexibility and the negative associations between the presence of unions and labour market flexibility held up even when the sample was divided into public and private workplaces. Nevertheless the effect of unions was weakened: unions tend to be associated with flexibility to a much greater extent in public sector workplaces than in private sector workplaces in most cases. This is illustrated by the three-way crosstabulation of functional flexibility by unionisation and sector.

**TABLE 13: PROPORTION OF UNIONISED AND NON-UNIONISED WORKPLACES WITH HIGH NUMFLEX2 (CORE PERIPHERY) BY SECTOR**

	PUBLIC SECTOR	PRIVATE SECTOR
NON-UNION	86.4 252	49.1 2657
UNION	28.3 2857	45.2 6541

NB: Percent of unionised or non-unionised workplaces in that sector with high NUMFLEX2 / Number of Cases

This pattern was replicated for most of the flexibility variables. The presence of unions was rather more strongly associated with higher levels of labour process flexibility (and lower levels of labour market flexibility) in the public sector than in the private but the relations were nevertheless distinctive in the latter sector. Thus, to take a labour process flexibility example (functional flexibility), amongst public sector workplaces 4% of non-unionised places had a high level of functional flexibility compared with 26% of unionised ones, whereas amongst private sector workplaces 17% of non-unionised workplaces had a high level compared with 20% of unionised workplaces. To the extent then that unions seek to resist labour

market flexibility and to encourage labour process flexibility this analysis suggests that they have been more successful in the public sector than in the private sector. There are however some notable exceptions to this pattern. First, product flexibility (PRDFLEX1) is more common amongst unionised than non-unionised workplaces in both the public and private sectors to an equal degree. Unions are equally 'successful' here regardless of sector. Second, in the case of both technical-organisational flexibility and working time flexibility unions appear to be associated with different trends in the two sectors. While unions are associated with higher levels of both technical-organisational and working time flexibility in the public sector they are associated with lower levels of both forms of flexibility in the private sector.

Unionism also continues to be significant when specific industry divisions are incorporated into the analysis. Although this was suggested by the regression analyses, various four-way crosstabulations were conducted in order to confirm the finding. Again, while unions are less effective in some industries (and sectors) than in others with respect to some of the flexibility variables, they tend to be associated with higher levels of labour process flexibility and lower levels of labour market flexibility regardless of sector and industry.

## DISCUSSION AND CONCLUSIONS

Both methodological and substantive conclusions can be drawn from this study. The difficulties concerning the determination of the correct causality in the relations between unionisation and flexibility highlights one of the limitations of cross-sectional survey data. Given that the causal relations between the two phenomena of interest are not amenable to any obvious resolution on the grounds of theory, time series data might provide useful clues as to the possible causal relations between unionisation and flexibility. Secondly, this study suggests the continued utility of simple bivariate techniques, such as correlations and crosstabulations, and simple multivariate techniques, such as three and four-way crosstabulations, when relations of substantive interest are not amenable to illumination through more statistically sophisticated multivariate analysis. When the data is meaningfully grouped and when the research is sensitive to the possible influence of other mediating variables such techniques enable relations to be clearly represented.

The results of the data analysis provide solid support for both of the hypotheses presented at the outset and for both neo-Fordist interpretations of the relation between unions and labour market flexibility and post-Fordist interpretations of the relation between unions and labour process flexibility.

First, the presence of unions (and higher rates of unionisation) are associated with lower levels of labour market flexibility, in particular with lower levels of numerical flexibility, pay flexibility and working time flexibility. On the one hand, it might be the case that workplaces where these forms of flexibility have been pursued are less conducive to the presence of unions and to their organisational efforts. Certainly this interpretation is supported by the data relating to the extent to which non-standard forms of employment are in use (NUMFLEX2) as well as by the data regarding the incidence of over-award payments (PAYFLEX2) and performance related pay (PAYFLEX3). It is possible that these practices hamper

the ability of unions to organise employees. Employees working under non-standard arrangements might feel less attachment to work (or less enamoured of unions) than their full-time permanent co-workers, and those employed in workplaces where over-award and performance related payments are relatively common might see less relevance in union membership than others.

On the other hand it is possible that unions have been at least partially successful in resisting labour market flexibility. Lower levels of non-standard employment (NUMFLEX2), higher levels of job security (NUMFLEX3) and the less likely resort of management to changing pay when business conditions change (PAYFLEX1) in unionised workplaces all support this interpretation. Standard conditions of work, job security and wage stability have certainly been traditional goals of the Australian labour movement.

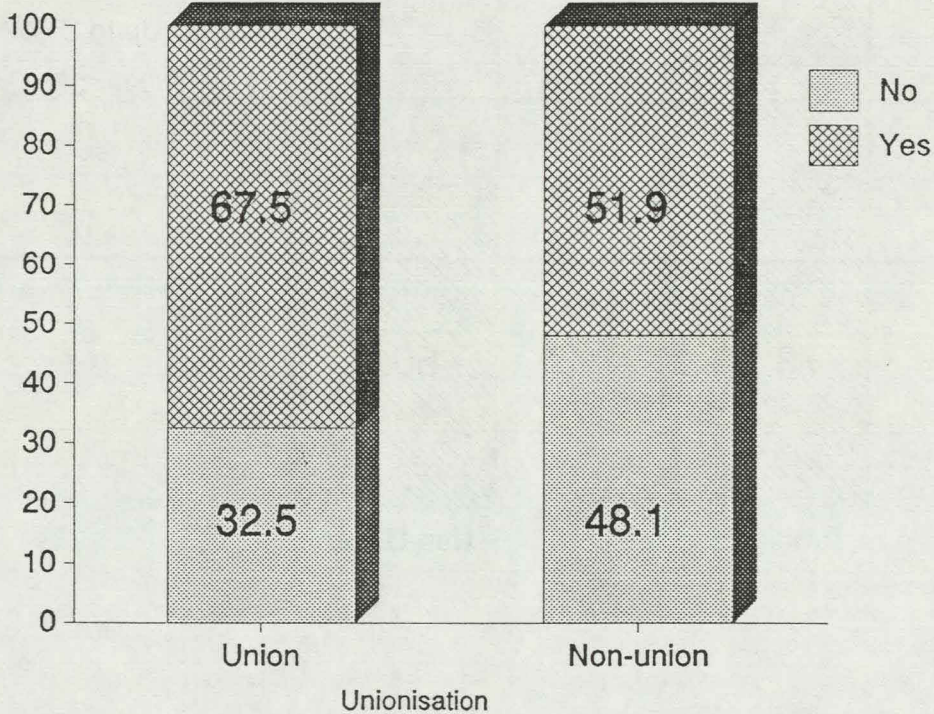
Second, unions are associated with higher levels of all except one of the measures of labour process flexibility: functional flexibility, procedural flexibility and product flexibility. Those enterprises that have undertaken strategies designed to enhance the flexibility of their labour process organisation emerge as slightly more conducive to unions than other firms. Alternatively unions might have been able to insist on the introduction of particular workplace structures that seek to facilitate worker input into the operation of the labour process and into the process of workplace change. It is possible that both sets of factors are at work here. In any event, job redesign, work groups and quality circles (FUNFLEX2) as well as formal joint consultative committees (PRCFLEX1) are more likely to have been introduced in unionised workplaces. Finally those workplaces that introduced a major service or product change in the two years preceding the survey (PRDFLEX1) were more likely to be unionised than those that had not. This finding suggests that the mere existence of unions and unionists does not of itself create an obstacle to innovation and workplace change.

Both neo-Fordist and post-Fordist analyses of the role and predicament of unions in the context of flexibility receive provisional support from this data. The neo-Fordist argument that increasing levels of labour market flexibility conceal threats to union representation at the workplace level is borne out to some degree by this analysis. Similarly the more optimistic post-Fordist prescription that unions can and should participate in labour process change to their (and their members') advantage also receives some support. The results also have implications for the strategic position adopted by Australian unions. It appears that, to the extent that unions have influenced the development of flexibility in Australian industry, they have to a limited degree been able to resist forms of labour market flexibility that appear to threaten the security and solidarity of workers. Moreover, it appears that unions have also been able to encourage the development of forms of labour process flexibility that facilitate (or depend on) the participation of workers and unions in the reorganisation of work and in the management of workplace change. This is to endorse the participation of organised labour in the pursuit of labour process flexibility, to commend the opposition of unions to labour market flexibility and to emphasise the capacity of the union movement to effect the form and nature of flexibility and its impact on Australian unionism.

APPENDIX

NUMFLEX3: EMPLOYMENT SECURITY

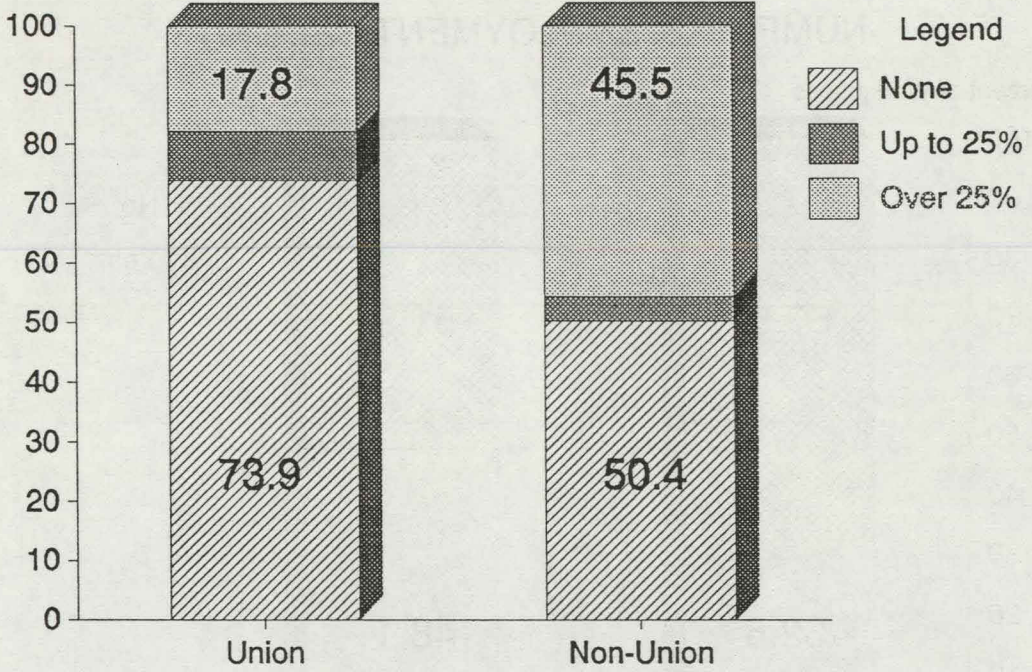
Percent of Workplaces



### PAYFLEX2: OVER-AWARD PAYMENT

Percent of Workplaces Paying Proportion of Employees

Percent of Workplaces



Unionisation

### PAYFLEX2: OVER-AWARD PAYMENT

Percent of Workplaces Paying Over-Award to over 50% of Employees

Percent of Workplaces

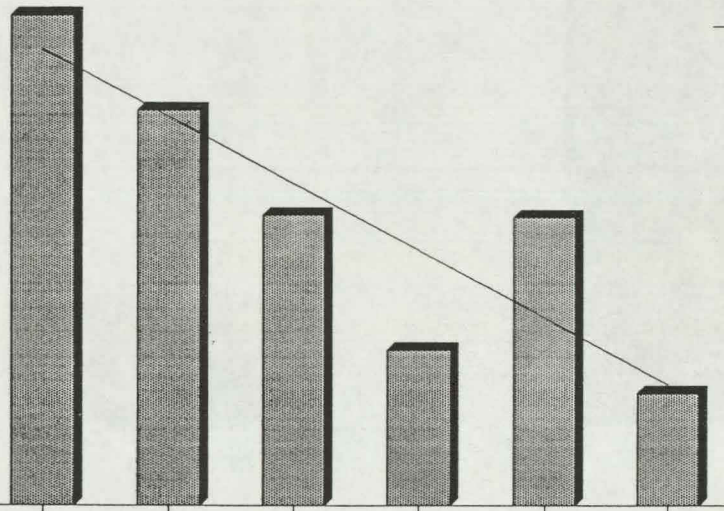
50  
40  
30  
20  
10  
0

None <25% 26-50% 51-75% 76-90% >90%

Union Density

Legend

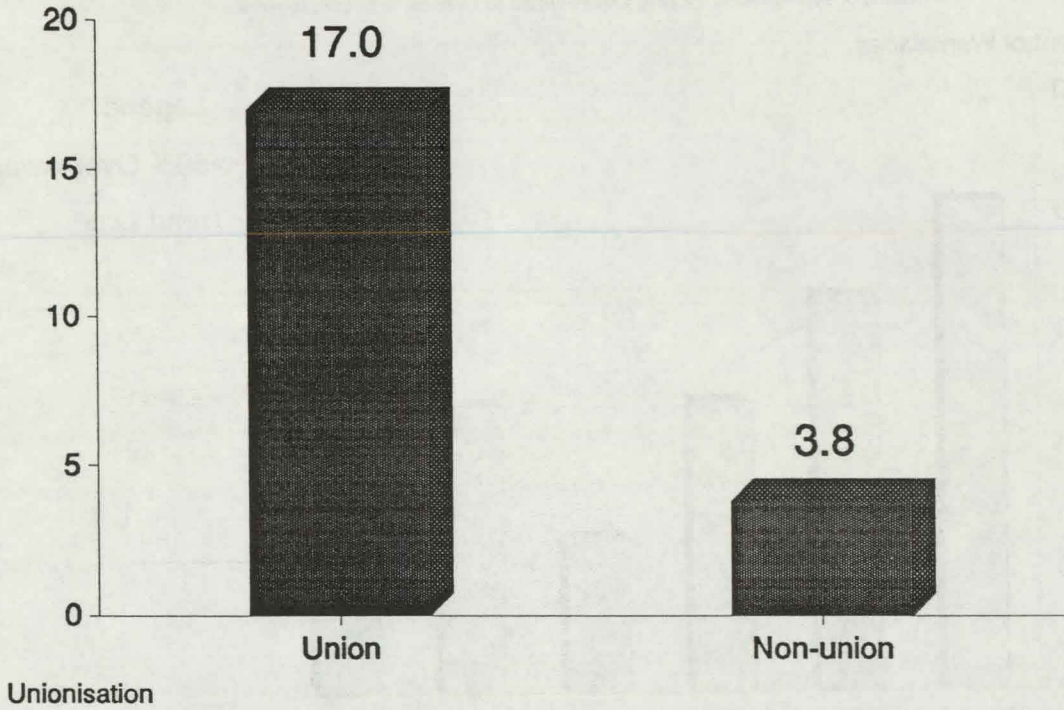
- >50% Over-Award
- Trend Line



### PRCFLEX1: JOINT CONSULTATIVE COMMITTEES

Percent of Workplaces with Formal Joint Consultative Committees

Percent of Workplaces



## REFERENCES

- Atkinson, J. (1984) 'Manpower Strategies for Flexible Firms', *Personnel Management*, August.
- Atkinson, J. (1985) *Emerging U.K. Work Patterns*, Brighton: Institute of Manpower Studies.
- Atkinson, J. (1987) 'Flexibility or Fragmentation? : The U.K. Labour Market in the Eighties', *Labour and Society*, 12(1), January, pp.87-105.
- Badham, R. and Mathews, J. (1989) 'The New Production Systems Debate', *Labour and Industry*, 2(2), pp.194-246.
- Bamber, G. Boreham, P. and Harley, B. (1992) 'Economic and Industrial Relations Outcomes of Flexibility in Australian Industry: An Analysis of the AWIRS Data' in Department of Industrial Relations, *Exploring Industrial Relations: Further Analysis of AWIRS*, Canberra: AGPS.
- Boreham, P. (1992) 'The Myth of Post-Fordist Management: Work Organisation and Employee Discretion in Seven Countries', *Employee Relations*, 14(2), pp.13-24.
- Boreham, P. and Hall, R. (1992) *Work Organisation, Industrial Relations Reform and Union Strategy in Comparative Perspective: The Illusion of Flexibility*, Paper delivered to the Ninth World Congress of the International Industrial Relations Association, Sydney, August-September.
- Bramble, T. (1988) 'The Flexibility Debate: Industrial Relations and New Management Production Practices', *Labour and Industry*, 1(2), June, pp.187-209.
- Bramble, T. and Fieldes, D. (1989) *Post-Fordism: Utopian Fantasy or Historical Break?*, Paper delivered to the 1989 TASA Conference.
- Burgess, J. and Macdonald, D.(1990) 'Productivity, Restructuring and the Trade Union Role', *Labour and Industry*, 3(1), March, pp.44-57.
- Burgess, J. and Macdonald, D.(1991). 'The Labour Flexibility Imperative', *Journal of Australian Political Economy*, No27, pp.15-35.
- CAITS (1986). *Flexibility: Who Needs It?*, London: CAITS.
- Callus, R. Morehead, A. Cully, M. and Buchanan, J. (1991). *Industrial Relations at Work: the Australian Workplace Industrial Relations Survey*, Canberra: AGPS.
- Ewer, P. Hampson, I. Lloyd, C. Rainford, J. Rix, S. and Smith, M. (1991) *Politics and the Accord*, Sydney: Pluto Press.
- Goodwin, M. and Maconachie, G. (1990) 'Voluntary Employment Agreements: Labour Flexibility in Queensland', *Labour and Industry*, 3(1), March, pp.21-43.

- Mathews, J. (1989)a *Age of Democracy: The Politics of Post-Fordism*, Melbourne, Oxford University Press.
- Mathews, J. (1989)b *Tools of Change: New Technology and the Democratisation of Work Organisation*, Sydney: Pluto Press.
- Meulders, D. and Wilkin, L. (1987) 'Labour Market Flexibility: Critical Introduction to the Analysis of a Concept', *Labour and Society*, 12(1), January, pp.3-17.
- Piore, M. and Sabel, C. (1984) *The Second Industrial Divide: Possibilities for Prosperity*, New York: Basic Books.
- Pollert, A. (1988) 'Dismantling Flexibility', *Capital and Class*, 34, Spring, pp.42-75.
- Pollert, A. (ed) (1990) *Farewell to Flexibility?*, Oxford: Basil Blackwell.
- Rimmer, M. and Zappala, J. (1988) *Labour Market Flexibility and the Second Tier*, Working Paper No3, June, Sydney: CIRRU.S.
- Streeck, W. (1987) 'The Uncertainties of Management in the Management of Uncertainty: Employers, Labour Relations and Industrial Adjustment in the 1980s', *Work, Employment and Society*, 1, pp.281-308.
- Wood, S. (ed) (1989) *The Transformation of Work?*, London: Unwin Hyman.

# Statistics In the Social Sciences A Mixed Blessing?

Flora Gill

## INTRODUCTION

The personal computer revolution, and the remarkable software industry it has spawned, have made quantitative techniques virtually household tools, almost as accessible as the wrench and hammer. Is this an ominous development? Wrenches and hammers certainly have their uses; and so do quantitative techniques. They equip our eyes, metaphorically speaking, with a magnifying glass, which enables us to see a coherent whole where the naked eye sees only an incoherent welter of detail.

Empirical observation has served a vital role in the rebellion against 'argument by authority' (Hendry 1980). Fact and reason, the twin pillars which challenged the intellectual authority of the church at the dawn of the modern era, still underlie the promise of 'free knowledge'. The systematic collection of data, and accompanying armoury of statistical techniques, have been the natural outcome of the quest to ground knowledge in fact. Furthermore, this paper argues, the statistical method is a formalisation of a widespread informal method of inference from observed matter. Consequently, it represents an inevitable development which is here to stay. It also has a very significant contribution to make.

The question, therefore, is not 'to use or not to use statistics?', but rather to what end, in what capacity, statistical techniques should participate in the pursuit of knowledge in the social sciences.

At the same time, the paper argues that we must recognise that the situation is complicated by the possible impact of the (statistical) tool on the language, structure, reasoning and general discourse the academic discipline. The question arises, therefore, whether we can minimise unintended consequences; can we control the tool, or will it control us?

Among the social sciences, economics has pioneered the use of statistical techniques, particularly regression analysis, giving rise to a whole new research program. Formally born in the 1930s, econometrics now boasts an impressive array of sophisticated analytical techniques. Although these can be put to fruitful use, this

paper questions the validity of employing regression analysis, on the strict terms laid down by econometric convention. Econometrics, it argues, is heavily influenced by the logical positivist view of science, a problematic feature given the extensive critique of logical positivism among philosophers of science in recent decades. This critique has implications for econometrics as the means to judge the validity of pure theory.

Setting aside the epistemological problems raised by this philosophical critique, further methodological concerns stem from the fact that econometrics ordinarily entails abstraction of aspects of a given socio-economic phenomenon, both because it is a quantitative method (which is forced to overlook many qualitative aspects), and in its axiomatic acceptance of existing disciplinary boundaries.<sup>1</sup> While such abstractions can be made on specific occasions without jeopardising the validity of the analytical conclusions, the number of issues which can safely be analysed in this way is not abundant.

This paper draws extensively on the critiques of logical positivism among philosophers of science. It also draws on methodological self-examination in the econometric literature. A major emphasis of the paper is the need to bring methodological debates to the fore, as an integral element of the intellectual discourse in the social sciences. If, instead, uncritical following of convention is allowed to reign supreme the increasing use of quantitative analysis is bound to distort our approach to problems in the social sciences.

## STATISTICAL INFERENCE; WHENCE DOES IT COME?

Is statistics the brainchild of a peculiarly mathematical bent of mind, or does it have a close affinity with the way we all, whether numerate or not, learn from observation? Notwithstanding the esoteric and formal language of statistical reasoning, and the fact that introductory statistics courses are universally seen as being among the toughest nuts for students to crack, statistics is a direct extension of commonsense reasoning.<sup>2</sup> This is vitally significant in any attempt to assess the strengths and limitations of statistical techniques in the social sciences.

I shall illustrate the affinity between formal (statistical) and 'informal' methods of inference using the notion of *correlation*. The method of correlation, so central to statistics and econometrics, is commonly used by people who have never encountered statistical formulae. I am referring not merely to those who may eyeball the columns of a table displaying numbers, but also to a much wider range of people who attempt to understand the social environment without the aid of quantitative methods. For instance, when we say that fascism tends to increase when the economy is in strife, we are linking two phenomena by a causal relationship on the basis of an observed correlation between the incidence of fascism and economic depression. We do this even though we are fully aware of the so called *problem of induction*, which warns that correlations can never strictly establish the existence of a causal link. We know this dictum perfectly well, and we even hold it in awe. In the final analysis, however, and as Hume himself emphasised, correlations are all that we have to go by, and so we resign ourselves to living with a body of knowledge which

<sup>1</sup> It is also forced to make further assumptions to allow mathematical tractability.

<sup>2</sup> Something which cannot, perhaps, be so readily said about the rest of mathematics.

falls significantly short of fully proven truth. This does not give us a *carte blanche* to see a causal link behind every correlation, neither is it an invitation to open the floodgates to an armory of regression techniques. Rather, it is a plea that, when we evaluate the role of statistical techniques in the social sciences, we should notice the omnipresence of inferences drawn from associations between events.

How does regression analysis fit into this picture? Although economists versed in econometric method will find the following two paragraphs standard knowledge, this brief detour is still worth taking. So, let us compare regression analysis with the practice of eyeballing two columns of a table, using an example from the AWIRS data set. Comparison of the magnitude of over-award rates of pay (measured as a percentage of the award rate) with the proportion of females in the workplace reveals that the over-award rate declines as we move from workplaces with relatively few women to those where women form a higher proportion of the workforce. A number of questions immediately spring to mind. Since women are concentrated in low paying industries and occupations, and are often employed in labour intensive industries (and so on), would this negative association between over-award pay and the proportion of female employees persist if we took into account the industry, occupation and labour intensity at the workplace? A series of cross-tab displays is not only a very cumbersome way to approach this question, but also very limited in what it can do. Multiple regression analysis, on the other hand, does the job more neatly and more accurately. The fact that tables remain in common use provides persuasive support for the use of multiple regression, since regression techniques represent an unequivocal improvement on a widely accepted practice which is here to stay.

I have identified the method of multiple regression as a tool particularly suitable for discerning those patterns of correlation which persist when other factors are taken into account. It is especially useful when we wish to address purely empirical questions such as, 'do larger firms pay higher over-award rates regardless of industry, occupation or union density at the workplace?' The issue becomes more complex once we take a step beyond the question of observed patterns of association to the meta issue of what causal linkages underlie these associations. For instance, it is obvious that workplace size may contribute directly to over-award rates through economies to large scale which increase the firm's capacity to pay. Alternatively, over-award rates may be causally related to altogether different factors which are associated with size. In this case, the correlation with size would vanish when we included these other variables in the regression analysis. This latter situation is not merely a theoretical possibility. Experience shows that established statistical associations can weaken or vanish entirely when richer, more detailed data sets are made available.

The above discussion shows that regression analysis is a useful tool to answer such questions as whether the correlation between A and B would persist if we took into account K, L and M, about which we happen to have data. The next step must be to address the question of what theoretical frameworks can account for the observed association. At the same time, we must also address another, equally important, issue: are there factors which are not accounted for in the statistical analysis which might lie behind the observed correlation? In this larger analytical program, regression analysis is a subsidiary tool, an intermediate phase, whose prime function is to place questions on the research agenda. Typically, only some of the major issues can be answered, even with a rich statistical data set. Others require

consideration of industrial relations, economic or political factors which are intrinsically undetected, or very poorly gauged, using the lens of statistics.

Time is such a factor; the particular history of a workplace, the industry or the nation are basically bypassed whenever cross-section data is used. For instance, the incidence of over-award rates across workplaces must be largely determined by past events. Once payments above awards exist, they are not so readily eliminated. Cross-section data can shed some light on this issue, but only to the extent that differences in workplace features observed at present are the same as those which prevailed in the past and relevant to the introduction of payments above awards. The recent surge of interest in the phenomenon of *hysteresis* among economists is testimony to the importance placed on the role played by history. Essentially, it is an acceptance that features observed in the present cannot alone predict future course (of the workplace, industry or the nation) because the particular historical path leading to the present state of affairs is vital in determining the course of future events.

The development of econometrics has been influenced by the philosophy of logical positivism, particularly by the manner in which this school defines the scientific role of empirical analysis. The influence of logical positivism in the social sciences is not confined to econometrics, but it is here that it has had a profound influence on practice. The methodological role which I have defined for regression analysis differs markedly from the role it is conventionally assigned. More generally, the role assigned to empirical analysis in the present paper represents a departure from logical positivism. This issue is discussed in the section below.

## ECONOMETRICS AND LOGICAL POSITIVISM

The proponents of logical positivism have outlined an ideal vision of science in an attempt to prescribe the conduct of 'true' scientific practice. Theory and empirical analysis are each assigned a specific task, with the primary role of theory being the derivation of propositions from a set of a basic premises using the method of *logical deduction*. These propositions are treated as hypotheses (hence the description of logical positivism as the *hypothetico-deductive model of science*) pending empirical confirmation. The role of empirical analysis, therefore, is to establish whether propositions are consistent with the observations made by empirical analysis. Note that, in this methodological framework empirical analysis focuses on hypotheses alone. The fundamental premises from which the hypotheses are logically deduced are *not* the subject of empirical analysis.

Logical positivism, however, has been losing ground steadily among philosophers of science since at least the 1960s because it has yielded neither a correct description of the actual process of science nor a valid prescription for scientific conduct. Although its founders were confident that theories would be discarded whenever theories failed to gain support from empirical evidence, experience shows that this idealised view has rarely guided actual practice. Regrettably so? No, argue the philosophers of science, appropriately so.

Michael Polanyi (1958), one of the first critics of logical positivism, pointed out that there is a vast gap between the normative stand taken by this school of thought and

actual scientific conduct, even in the 'scientific' disciplines *par excellence*: physics and chemistry. Polanyi argued that poor instrumentation and deficient data bases, rather than flawed theories, may be the true culprits when theoretical propositions fail to be confirmed by experiment; in such cases, rejection of the theories would set back the scientific clock. Therefore, he argued, a theory which commands a scientist's trust should not be rejected too readily when empirical results fail to support it. In contrast to logical positivism, this approach implies that we should subject the premises of a theory to critical assessment; it also casts doubt on theories based on incredible premises.

From the perspective of the social sciences, it is particularly important to notice that by restricting attention to the correspondence between hypotheses and empirical evidence, and by positing that a lack of such correspondence will automatically eliminate false premises, logical positivism overlooks the possibility that alternative analytical frameworks can explain a given body of empirical evidence. This is a critical point, because basic premises play a crucial social, political and economic role in real life. Wrong premises, for instance, can place blame for industrial strife, unemployment, inflation or poverty on the wrong party. The likelihood of such misconceptions is significant; hypotheses derived from false premises can still find support in empirical observation because it is often the case that a number of different sets of premises can yield a given hypothesis. In failing to address this possibility, logical positivism has in fact bolstered 'incumbent' theories against their competitors.

Turning to econometrics, the influence of the logical positivist conception of science is evident in the language it employs. This does not necessarily reflect a conscious allegiance to logical positivism, but rather an uncritical acceptance of this framework inherited from an earlier era. For instance, econometricians commonly use the expression 'test of hypothesis'. Similarly, the term 'explanation' is used when reporting a significant statistical association between two variables which had been hypothesised to be interrelated. The significance of a term such as 'explanation' is that it inevitably suggests a causal association. Furthermore, empirical results which display statistically significant regression coefficients (with the 'correct' sign) are described as 'supporting the model', suggesting that congruence between observations and hypotheses lends credence to underlying conceptual framework. Yet such support is only tentative, because of the possibility that other theories could provide a more apt description of the underlying causes. When the premises are not subjected to scrutiny, the conclusion that the model is supported by the data is certainly misleading.

Finally, as a rule, econometricians talk about 'estimation' of parameters which are specified in pre-existing models. Econometrics is rarely seen as a vehicle for uncovering persistent patterns of associations, in the sense discussed in section II above. Indeed, to establish legitimacy for their work as *econometric* (ie empirical), scholars must refer to the 'estimation' of parameters.<sup>3</sup> This interest in estimation alone, and lack of interest in the generation of descriptive patterns of statistical association as an end for itself, is intimately related to the wedge that logical positivism has driven between the so called *method of induction* and the *method of*

<sup>3</sup> Econometricians do use regression analysis to generate stylised facts, but the reward system is not conducive to this type of empirical work. This is despite Klein's observation that "a significant part of econometric analysis in practice is the search for regularity in economic relationships. The single most important tool is the method of multiple regression (Klein 1988, p. 11).

*deduction*, and the resulting loss of interest, at least among econometricians, in the method of induction as a partner in the scientific agenda.<sup>4</sup> The induction/deduction dichotomy is problematic, as the next section argues. This problematic aspect may be ignored, but only if we share the fundamental assumption of logical positivism, that false premises can never give rise to hypotheses which are in agreement with observed phenomena.

## THE TENSION BETWEEN INDUCTION AND DEDUCTION: WHAT ROLE FOR EMPIRICAL ANALYSIS?

Can the method of induction advance the cause of scientific knowledge, or should the method of deduction alone be accepted as part of the core which defines science? This issue is central to debates between neoclassicists and institutionalists, main-stream economists and Marxists, and among mainstream economists it is at the centre of the debate between those who argue that 'assumptions do matter' and those who disagree.

David Hume brought this tension to the fore when he raised the 'problem of induction', arguing that truth can be only define as a logical property of analytic statements derived by the process of logical *deduction*. In contrast, synthetic propositions which are based on observed empirical regularities (eg the sun has risen every day, therefore, the sun will rise tomorrow) can never be described with absolute certainty and there is no sense in which they can be treated as absolutely true.

Long before Hume, a similar warning was voiced by the Greek historian Thucidides when he stated the fallacy of *post hoc ergo propter hoc* ('after this, therefore because of this'). What both of these sages have imprinted on the modern mind is the warning that causality must not be read too readily into patterns of correlated empirical relationships. Hume, however, went one step further, coining the concept of asymmetry between the truth content of statements based on the method of induction and those generated by the method of deduction. Essentially, this endowed the method of deduction with the property of truth, even though the substantive truth of statements derived by deduction depends totally on the truth of the underlying premises. Where does the content of the premises come from? The answer must be that they can be derived only by the method of induction. The problem of induction, it turns out, has not vanished. If we are interested in substantial, rather than merely logical, truth we must accept that the problem of induction dogs both deductive and inductive statements.

The method of induction, however, still bears the scars of the logician's assault. Inductive construction of knowledge has tended to be relegated to the class of non-scientific (ie inferior) intellectual pursuits by the logical positivists, the method of deduction forming the core of the logical positivist prescription for the sound practice of science. Empirical analysis cannot play an active role in the formation of theory, except as an adjudicating agent, passing 'yes' or 'no' verdicts on propositions logically deduced from theoretical premises, with empirical testing of hypotheses deduced from the basic premises bearing the sole responsibility of assessing the validity of a theory.

This is the core of doctrinaire logical positivism. Yet, as I have argued above, the concept of logical truth, which sustains the dominant status of the hypothetico-deductive method, can be of little use when the underlying premises are not credible. Substantial truth demands sound premises; logical truth alone is vacuous or outright deceptive. The hypothetico-deductive method cannot escape the problem of induction; logical positivism had over-stated its case.

A more detailed survey of logical positivism is beyond the scope of this paper. What matters for the present discussion is that the critique of logical positivism has questioned the role assigned by it to empirical analysis. This critique, I propose, has essentially reinstated the view that empirical analysis has an important role to play in the inductive construction of knowledge, and that such knowledge is vital to the scientific enterprise.

The tension between the methods of induction and deduction is unavoidable. Reliance on induction alone runs the risk of generating a body of knowledge which is no more than a series of *ad-hoc* rationalisations for observed empirical phenomena. This is hardly satisfactory, and so we must continuously force a dialogue between a given theoretical body and observed matter. To some extent, this involves subjecting theoretically derived propositions to the scrutiny of empirical observation, as demanded by logical positivism. However, incumbent theories must be continuously subjected to scrutiny by finding plausible competing analytical explanations which are consonant with the observed patterns of empirical associations. Correspondence between observed matter and 'predictions' made by the incumbent theory must not be allowed to support an incumbent theory over another which possesses equally (or more) credible premises.

In summary, under logical positivism empirical analysis is guided by the hypotheses generated by the existing (dominant) theories. This is a very unfortunate restriction on the domain of scientific empirical endeavour. Rather, empirical analysis must be encouraged to engage in an extensive search for patterns of persistent association, both over time and across space. It should, similarly, be given the blessing to engage in case studies.

The aim of such empirical investigations should be not only to probe the received wisdom (in Academe and outside), but also to place new questions on the intellectual agenda. Inevitably, this process will generate theoretical propositions in a manner very akin to the method of induction. But such is (scientific) life. There are no absolute certainties, only more and less hopeful processes. A more hopeful process would demand that the dialogue between theory and empirical observation be a two way road. Existing theory should not set limits to the relationships which should be examined by empirical research. Empirical research should be expected not only to subject hypotheses to test (its sole role under logical positivism), but also to venture into the unknown, enriching our knowledge of what exists in the social science domain within which we live.

## ECONOMETRICS UNDERGOES SELF-EXAMINATION

### Two Examples

In the grand scheme of the academic division of labour, questions of method are the domain of philosophers of science, construction of theories is left to pure theorists (at least in economics), whilst econometricians humbly focus on the empirical testing of the theories constructed by the theorists. Fortunately, econometric literature has, on occasion, concerned itself with fundamental questions of method, particularly thanks to presidential and other public addresses where soul searching is not only tolerated but welcomed. These occasions have provided an invaluable opportunity to glimpse the doubts lurking behind the calm exterior of the discipline.

The methodological concerns of econometricians have centred on two questions: (i) does econometric practice accord with the rules of scientific conduct, and (ii) what aspects of this practice should be modified or eliminated? In the process of grappling with these issues, econometricians have given us some useful insights.

Anxiety about the scientific status of econometrics has revolved essentially around the question of whether it can fulfil the role assigned to empirical analysis in the logical positivist view of science. Thus, in 1979 Thomas Mayer, in his presidential address to the 54th Annual Conference of the Western [US] Economic Association, expressed concern that

"... a few false hypotheses are rejected, but many hypotheses - however contradictory - cannot be rejected and hence co-exist. And what is just as bad, even if all or most of the econometric evidence points in the same direction, those who hold the contrary view need not be intimidated by this since there is now some empirical evidence that many econometric results are not reliable."

(Mayer 1980, p. 166).

Mayer lists a number of factors underlying this state of affairs, among them the perennial poverty of data:

"... it would help if we can raise the standard of what is acceptable work by evaluating the validity of research more on the basis of the likely validity of results, and less on the technical sophistication of techniques. For example, it is likely that despite their well-known problems, survey methods<sup>5</sup> would be used more in economics if it were not for the fact that since they seem so simple, there is little kudos gained by using them." (*ibid.* p. 173).

These comments reveal a concern about the manner in which social dynamics within the academic community guide research, a view more bluntly repeated in the following:

"Much of the published research consists of taking a new technique for a walk rather than really trying to solve a problem." (*ibid.* p. 177).

Although he finds much scope for improving techniques, he nevertheless concludes with a plea:

"Finally, given all the weaknesses of econometric techniques, we should be open minded that truth does not always wear the garb of equations, and is not always born inside a computer." (*ibid.* p. 176).

At about the same time, in a public address at the London School of Economics, David Hendry raised a question which is best described by the title of his talk: "Econometrics - Alchemy or Science?" The influence of the logical positivist hypothetico-deductive model of science is evident when describing science in general, Hendry says:

"... data are used to check and '*test*' theories. Theory creation may be inductive, but demonstration and testing are *deductive*, although in inexact science testing will involve statistical inference [rather than controlled laboratory experiments]." [Emphasis added.] (Hendry 1980, p. 388).<sup>6</sup>

Alchemy can creep into econometric practice, Hendry believes, because econometric techniques provide scope for deception. For instance, he reports that inflation has been successfully regressed on lagged values of rainfall, obtaining a superb fit, with significant coefficients and, with the aid of an appropriately fitted functional form, the error term was made well behaved (ie with no serial correlation or Heteroscedasticity).<sup>7</sup> But, he says, such deception is easily detected because it lacks a theoretical structure to support the proposition that rain leads to inflation, concluding that:

"The crucial factor of my argument is that *before* doing this regression the relevant theory enabled me to *deduce* what would occur and hence to construct the desired examples on my first try - what could be more scientific?" [emphasis in the original text] (*ibid.* p. 395).

This seems to suggest that the established ('relevant') theory can in fact find empirical support, even when false, as long as it is established. I shall return to this point later. For the moment, let us note the array of problems Hendry himself identifies, despite the confident views reported above.

His survey of 'econometric problems' starts by approvingly citing Patinkin's observation that:

"Though not all of Keynes' criticisms [of econometrics] were well taken ... I find it somewhat depressing to see how many of them are, in practice, still relevant today" (Patinkin 1976, Quoted in Hendry 1980, p. 396).

Hendry himself then adds that:

<sup>6</sup> I should point out that Hendry takes a modern Popperian (1959, 1972) view of science, which relinquishes claims of *verification* of theories, accepting that empirical analysis can only *falsify* theoretical propositions. Otherwise, however, his program remains logical positivist.

<sup>7</sup> He offers another example: inflation was also successfully regressed on the number of cases of dysentery in Scotland (in the previous year).

"Forty years after Keynes wrote, his review should still be compulsory reading for all who seek to apply statistical methods to economic observations."  
(*ibid.* p. 396)

There is only one point of disagreement, he says, between himself and Keynes. He rejects Keynes' assertion that "... no economic theory is ever testable..." (*ibid.* p. 396), noting that he doubts that Keynes himself accepted this since in this case 'economics ceases to be scientific'. Keynes' view is presented by Hendry in the form of a list of problems, which are worth citing verbatim:

- Using an incomplete set of determining factors (the problem of omitted variables).
- Building models with unobservable variables (such as expectations), estimated from badly measured data.
- Obtaining spurious correlation from the use of proxy variables.
- Being unable to separate the distinct effect of multicollinear variables.
- Assuming linear functional forms not knowing the appropriate dimensions of the regressors (ie independent variables).
- Mis-specifying the dynamic reactions and lag length.
- Incorrectly prefiltering data.
- Invalidly inferring causes from correlations.
- Predicting inaccurately (non-constant parameters).
- Confusing statistical with economic significance of results.
- Failing to relate economic theory to econometrics.

Hendry then adds six more points of his own:

- Stochastic mis-specification.
- Incorrect exogeneity assumptions.
- Inadequate sample sizes.
- Aggregation problems.
- Lack of structural identification.
- Inability to refer back uniquely from observed empirical results to any given initial theory. (*ibid.* p. 396).

Despite this long list of problems, Hendry concludes that econometrics is capable of living up to its *raison d'être*, the testing of theoretical propositions ("...the three golden rules of econometrics are test, test and test...". *ibid.* p. 403).<sup>8</sup>

<sup>8</sup>

I have restricted my discussion to Thomas (1980) and Hendry (1980). For another major examples of self examination see Leamer (1983).

## EVALUATION

Hendry's optimism seems to rest on three propositions: (i) the guidance which is provided to empirical analysis by established theory, (ii) economic upheavals (such as the oil price shock of the 70s) generate a continuous variety of data, providing an opportunity to check theoretical predictions against new data, and (iii) under certain conditions, abstraction from an array of 'non-economic' factors and non-quantifiable 'economic factors' is valid when testing theoretical propositions.

At one level, all three points are valid. It is quite misleading to claim that a causal link underlies an observed statistical association when there is no theoretical framework to suggest the existence of such a link.<sup>9</sup> Similarly, richer data sets certainly improve the quality of empirical analysis. The third point is also valid, and extremely important. It is true that statistical analysis can generate valid tests of a theoretical proposition, even when it abstracts from an array of factors underlying the phenomenon under inquiry. In this sense all three points are undisputable.

However, as Hendry's paper emphasises, abstraction can be justified only if it satisfies certain conditions. Indeed, an invaluable contribution of his paper is that it elegantly (albeit only formally) outlines the essence of these conditions. While this outline provides an analytical justification for econometric analysis, it is equally valuable in a critical evaluation of econometrics, enabling us to highlight some crucial limitations of the econometric method which severely limit the range of theoretical propositions that it can validly test.

This critical approach does more than just sow doubt. It also offers us an analytical foundation for examining a wider range of methodological issues, including even the question of disciplinary boundaries.

Econometric analysis, Hendry's discussion points out, involves two levels of abstraction. The first derives from economic theory, positing that the parameters the econometrician seeks to estimate depend on only a small number of factors which have been identified by established economic theory. This first level, therefore, represents abstraction dictated by existing disciplinary boundaries:

"An 'economic theory' corresponds to asserting that  $P$  depends on only a smaller number of parameters, denoted by the vector  $\phi$ , and written as:  
 $P = F(\phi) \phi \in \Theta$ " (Hendry 1980, p. 400)

where  $\Theta$  is the parameter space and  $P$  is the set of coefficients econometrics seeks to estimate. Yet, the present paper argues, the estimation will be valid, that is unbiased, only if the boundary separating  $\phi$  from the remainder of  $\Theta$  is valid. In general, some of these factors are either non-quantifiable or not available within the data set, and, therefore, econometric estimation requires further abstraction.

Hendry's formal analysis focuses only on the conditions which would justify the abstraction involved at the second level. Technically, these conditions can be described as the requirement that the 'likelihood function be decomposable'. As Hendry points out, in formal terms this involves the decomposition of the likelihood function  $L(\phi; \cdot)$

9

This would represent a flagrant disregard of the warnings advanced by both Thucydides and Hume.

$$L(\phi; \cdot) = L_1(\phi_1; \cdot) * L_2(\phi_2; \cdot),$$

where

- $\phi$  denotes the factors determining the coefficients in question ( $P$ ), according to economic theory,
- $\phi_1$  denotes the factors included in the empirical analysis, and
- $\phi_2$  denotes the (economic!) factors omitted from the empirical analysis

In addition,  $\phi$  must obey the condition

$$\phi = \phi_1 \cup \phi_2. \text{ }^{10}$$

The intuition behind this technical statement is that aspects abstracted from the analysis must be separable from the aspects considered by it. In particular, this implies that the omitted aspects must vary in a manner which is independent of the aspects explicitly considered by the analysis. In more technical terms, decomposability of the likelihood function requires that the variables which are abstracted from the analysis are actually *orthogonal* to the included variables (Goldberger 1964: 200-201). This also requires that the functional relationship between the included and omitted variables is additively separable.<sup>11</sup> This is a very valuable property of statistical analysis<sup>12</sup>, because it allows us to omit from the statistical analysis many variables which in reality do influence the phenomenon we are focusing on.

Yet, when there is cause to believe that the included variables reflect the pattern of variations in the omitted (relevant) variables, empirical estimates are biased, and consequently, the empirical analysis cannot be treated as a valid test of the theory. This issue should be intuitively obvious, if we omit a relevant variable which shares (by chance or for good causal reasons) a pattern of variation (say across workplaces) with an included independent variable, how can we know that what we see is the effect of the included, rather than the omitted, variable? Lack of data often forces us to omit relevant variables. So the issue does have a practical relevance. Even though the problem of omission of (theoretically relevant) variables leads the Keynes/Hendry<sup>13</sup> list of econometric problems, there are very few examples of applied work where the authors openly explore the nature of the biases (ie upward or downward) which are likely to affect their work as a result of omitted variables. This is, despite the fact that underestimate biases are acceptable, because they reinforce the statistical significance of estimates, whereas overestimate biases undermine them.

Hendry describes the issue omission of economic variables as potentially harmful, but the abstraction imposed by disciplinary boundaries is shrouded in a veil of silence. Abiding by convention, Hendry axiomatically accepts this abstraction, yet the above analysis applies equally well in this case. That is, if economics (or industrial relations) ignores relevant 'non-economic' (or non-industrial relations)

<sup>10</sup> This follows discussion in Hendry 1980, p. 400.

<sup>11</sup> These propositions are also made in Gill (1981).

<sup>12</sup> Also see Koopmans (1950).

<sup>13</sup> Note that Hendry is one of the leading scholars in the field of econometrics.

influences, it must acknowledge that where the patterns of variation of 'economic' and 'non economic' aspects are statistically associated, econometric estimates are biased and therefore incapable of testing the theoretical propositions.

It must be emphasised that the conditions required for abstraction to be justified vary with the specific issue being considered. In some instances they justify the abstraction both of variables customarily not within the discipline's domain and of non-quantifiable variables in general. In other instances, however, the principles outlined in Hendry's paper demand a shift of disciplinary boundaries and consideration of aspects which are not amenable to statistical analysis. In this case, empirical analysis may need to resort to non-econometric methods (eg case studies or comprehensive historical analysis). For instance, consumer responses to a particular price change may often be safely analysed within the boundaries of economics employing quantifiable variables, whereas tests of propositions in the area of labour economics are far more likely to run up against barriers imposed by disciplinary boundaries and the problem of non quantifiable aspects.

The idealised notion of laboratory experiments as the ultimate judge of theoretical proposition, has had immense influence on the evolution of econometrics. Indeed, econometrics can be described as a collection of sophisticated techniques all of which strive to bring a given body of statistical data as close as possible to a body of data which would have been generated by a controlled laboratory experiment. The results of these analytical endeavours are impressive; econometrics has made significant strides in its attempt to bridge the gap between the body of raw statistical data available to the economist and the ideal 'laboratory' data. However, as I have argued above, only a very limited range of theoretical propositions can be tested in the conventional sense of the word. This is true even if we turn a blind eye to the wide range of philosophical challenges to logical positivism.<sup>14</sup> The gap remains large, not simply because of poverty of data, problematic disciplinary boundaries and non-quantifiable factors, but also because of the questionable nature of the idea that complex socio-economic phenomena can be decomposed into their individual components, each free to vary individually. If, on the other hand, we feel that many significant social and economic phenomena cannot be treated as the sum of their individual components, the metaphor of the controlled laboratory experiment becomes problematic.

At fault, I believe, is the very attempt to force the analysis of socio-economic phenomena into the straight-jacket of the idealised laboratory experiment. This has encouraged the axiomatic acceptance of the assumption that an empirical assessment of the *independent* role of *individual* variables is not only desirable but also feasible. Technically, this involves the implicit assumption that the relationship between determining variables and the phenomenon under investigation is linear additive (in the value of the variables themselves or their logarithm).<sup>15</sup>

---

14 A fundamental critique of logical positivism has been levelled at its assumed theory/fact independence. For this and a more comprehensive review of the challenge to logical positivism, see Chalmers (1976), Caldwell (1982) and Blaug (1980).

15 Absence of such independence is treated as a mere oddity, the 'problem of multicollinearity'. Multicollinearity, however, may be not just a property of the sample, but rather property of the underlying population, reflecting real world interdependence (Intriligator, 1978, p. 155). In addition, it is a methodologically significant issue because multicollinearity between measurable economic variables and non-measurable economic and non-economic variables (or omitted but potentially measurable non-economic variables) renders the *ceteris paribus* proposition an invalid abstraction assumption.

My central point is that the extensive use of regression as an estimation (rather than descriptive statistical) technique in empirical analysis has inevitably discouraged the conceptualisation of structures which do not readily fit into econometric method.

### A MIXED BLESSING IT IS

The above has emphasised the limitations of regression analysis as a vehicle for either testing theoretical hypotheses or for assessing the magnitudes of the causal effects of individual variables. In both cases, regression analysis is involved as an 'estimation' technique. On the other hand, in section II above it is argued that regression techniques can be fruitfully used in a different capacity, as producers of sample 'descriptive statistics'.<sup>16</sup> The paper does not argue against the use of regression as an estimation technique in general, but it emphasises that the scope for such applications is more limited than ordinarily assumed.

In particular, the paper emphasises the constructive role that regression analysis can play as a descriptive (inductive) method, uncovering correlations which persist even when we include a large range of variables in the multiple regression analysis (see section II above). Such persistent correlations can play a useful role in charting the next item on the research agenda. In this next step, case studies and comprehensive historical analysis should be seen as being at least as significant contributors to the progress of the social sciences as studies based on regression analysis.

So why is the use of statistics a mixed blessing? It is this because tools originally designed as humble servants, often assumed a command over their masters. Not surprisingly, the array of available techniques tends to define what is a suitable research problem, selecting those which most readily fit into the technique's mould and discouraging the investigation of issues which do not fit the mould, regardless of their intrinsic merit. Secondly, theoretical frameworks in general, and technical methods such as econometrics in particular, develop their own formal language.<sup>17</sup> This language then exerts a powerful influence on the general intellectual discourse within the discipline, affecting the intellectual prism through which real-world phenomena are conceptualised and rendering invisible certain members of society or parameters of social (and economic) structures. The dominance of applied statistics in the econometric mould is likely to render history, complex power issues, subtle political and ideological influences and a whole gamut of qualitative aspects of labour relations invisible.

If quantitative methods are allowed to assume the status of the scientific tool par excellence, then statistics can lead us astray. Alternatively, if we are willing to look methodological questions in the eye, adopting methodological discussions as integral to the ordinary disciplinary intellectual discourse and acknowledging the problematic nature of the simple dichotomy which logical positivism has drawn between science/non-science, objective/subjective knowledge, theory/fact and the properties of the methods of inductive and deductive construction of knowledge, then we have

<sup>16</sup> As such, these may also serve as reliable estimates of correlation in the larger population from which the sample was drawn (ie without being treated as actual estimates of coefficients appearing in a particular theoretical model).

<sup>17</sup> For a brief discussion of the cognitive differences between *formal* and *natural* language see Leibler (1991), chapter 7; some interesting epistemological issues ensue.

chance to tame the shrew, to harness statistics in general, and regression analysis in particular, to perform the constructive job they can do so admirably.

## REFERENCES

- Blaug, Mark (1980) *The Methodology of Economics or How Economists Explain?*, Cambridge University Surveys of Economic Literature. Cambridge: Cambridge University Press.
- Caldwell, Bruce (1982) *Beyond Positivism: Economic Methodology in the Twentieth Century*. London: George Allen & Unwin.
- Chalmers, A. F. (1976) *What Is This Thing Called Science?* St. Lucia, Queensland: Queensland University Press.
- Gill, Flora (1981) 'Some Methodological Implications of the Marginal Revolution', *Australian Economic Papers*, 20: 72-82.
- Goldberger, Arthur S. (1964) *Econometric Theory*. New York: John Wiley & Sons.
- Hendry, David F. (1980) 'Econometrics - Alchemy or Science?' *Economica*, 47: 387-406.
- Intriligator, Michael D. (1978) *Econometric Models, Techniques and Applications*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Klein, Laurence R. (1988) 'The Statistical Approach to Econometrics', *Journal of Econometrics*, 37: 7-26.
- Koopmans, T. C. (1950) 'When is an Equation System Complete for Statistical Purposes?' in T. C. Koopmans (ed.) *Statistical Inference in Dynamic Models*. New York: John Wiley & Son.
- Kuhn, Thomas S. (1970) *The Structure of the Scientific Revolution*, Second Edition. Chicago: University of Chicago Press.
- Leibler, Justin (1991) *An Invitation to Cognitive Science*. Oxford: Basil Blackwell.
- Leamer, Edward E. (1983) 'Let Us Take the Con out of Econometrics', *The American Economic Review*, 73: 31-43.
- Mayer, Thomas (1980) 'Economics As a Hard Science: Realising Goal or Wishful Thinking?', *Economic Inquiry*, XVIII: 165-178.
- Patinkin, D. (1976) 'Keynes and Econometrics: On the Interaction Between Macroeconomic Revolutions and the Interwar Period', *Econometrica*, 44:1091-1123.
- Polanyi, M. (1958) *Personal Knowledge: Towards a Post Critical Philosophy*. London: Routledge & Keegan Paul.
- Popper, K. (1959) *The Logic of Scientific Discovery*. New York: Harper.
- Popper, K. (1972) *Conjectures and Refutations: The Growth of Scientific Knowledge*. London: Routledge, & Keegan Paul.

## **ACIRRT**

The Australian Centre for Industrial Relations Research and Teaching (ACIRRT) at the University of Sydney was established as a Key Centre of Teaching and Research in 1989 through a grant from the Commonwealth Department of Employment, Education and Training. The Centre is closely linked with the University's Department of Industrial Relations, which has a long and distinguished history of teaching and research in this area.

ACIRRT's main brief is to improve the quality of industrial relations teaching and research in Australia. This goal is being pursued through a range of activities including seminars, conferences and research projects conducted by members of ACIRRT and researchers from other institutions.