

WORKING PAPERS IN ECONOMICS

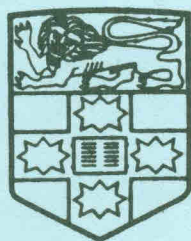
SHORT RUN POLICY ANALYSIS OF EMPLOYMENT,
FOOD PRICE AND RURAL-URBAN MIGRATION FOR
A LABOUR-ABUNDANT DEVELOPING ECONOMY

by
SoI Kew Kim

No. 86

January 1986

DEPARTMENT OF ECONOMICS



The University of Sydney
Australia 2006

SHORT RUN POLICY ANALYSIS OF EMPLOYMENT,
FOOD PRICE AND RURAL-URBAN MIGRATION FOR
A LABOUR-ABUNDANT DEVELOPING ECONOMY

by
SoI Kew Kim

No. 86

January 1986

National Library of Australia Card Number and ISBN
0 949269 52 2

ABSTRACT

The purpose of this study is to derive a linear model for food price determination, rural-urban migration, and non-agricultural sector's employment change. The linear model is used to analyse the effect of employment policies on food price, internal migration and employment. It is shown that the model can be conveniently used to translate macro-economic policy effects into corresponding two-sectoral economic effects. Although three equilibrium schedules, instead of two, comprise the model, its manipulation proves to be as flexible as the more familiar IS-LM model in policy impact analysis.

Short Run Policy Analysis of Employment,
Food Price and Rural-Urban Migration for
a Labour-Abundant Developing Economy

Since Schultz commented on the possibility of foreign food aid having a detrimental effect on recipient country's food output, through its price effect, a substantial interest has been directed to the analysis of the economic effects of imported food. This paper is another such attempt but it adds both rural-urban migration and the urban labour market as additional considerations.

Agriculture is defined to be the food-producing sector and non-agriculture as all non-food producing activities. Food is used as a symbolic product representing a group of essential wage goods produced by agriculture: food, cotton, fire-wood, etc.. Commercialized agriculture, producing mainly for exports, is re-classified into non-agriculture. Land in agriculture is assumed to be largely owned by the extended family system which uses family members to cultivate the land and uses relatively negligible amount of modern capital goods.

Contrasting with the agricultural sector, the non-agricultural sector uses both capital and hired labour service to produce output. Its product market is assumed internationally open, whereas domestic market for food is assumed closed. Given the international price of non-food product, food price is determined by domestic market forces only.

Demand for labour in the non-agricultural sector is determined by the equality condition between the marginal labour product and wage rate which is expressed in terms of non-food product. Although wage rate is assumed given in the short run, its compensatory response to changing food price is allowed in the model.

The internal migration of the work force between the agricultural and non-agricultural sectors is primarily governed by the expected earnings differential and employment opportunities.

The model economy comprises three market relations: food market, internal migration, and non-agricultural labour market. The model is defined in Section II, and in Section III it is used to analyse policy impacts of wage subsidy, direct employment, and food price support policies. Relevance of the model for macroeconomic analysis is discussed in Section IV. Section V examines economic effects of technological progress.

II

A conventional approach is taken to consider food price responding to the difference between demand for and the marketable surplus of food, with foreign food aid additively included in the supply side:

$$(1) \quad \frac{dp}{dt} = D [L,p] - S [N,p] - F$$

Square brackets [] are used to indicate the existence of functional relationships between the preceding variable and variables appearing inside brackets.

D = demand for food

L = non-agricultural employment

p = the relative price of food (in terms of non-food product)

S = domestic marketable surplus of food

\bar{N} = total population

F = the quantity of food imported under foreign aid scheme

N = non-agricultural work force

$\frac{dp}{dt}$ = time derivative of p

The r.h.s. expression of equality sign in Eq. (1) represents excess demand (D-S-F) for food, and food price rises or falls in proportion to the excess demand. For mathematical convenience the proportionality factor (λ) is assumed to be unity.

Demand for food is primarily determined by non-agricultural sector's wage rate and employment. Food being a principal wage good, its price change may influence wage rate even in the short run: $w = w [p]$ with $\frac{dw}{dp} \geq 0$. When such compensatory change of wage rate is not excessive demand must be negatively affected by food price. Thus, demand for food

is defined to be a negative function of price ($\frac{\partial D}{\partial p} < 0$) and a positive function of employment ($\frac{\partial D}{\partial L} > 0$).

All agricultural work force is assumed to be productively engaged in food production such that every worker produces at least as much food as he consumes it. Given this assumption, marketable surplus of food (S) becomes a positive function of agricultural work force ($\frac{\partial S}{\partial(N - N)} > 0$ or $\frac{\partial S}{\partial N} < 0$). The surplus is a positive function of food price ($\frac{\partial S}{\partial p} > 0$), because food consumption per agricultural worker is expected to be negatively affected by food price and food output may positively respond to food price through the latter's favourable effect on work incentive of agricultural workers.

Rural-urban migration is defined to be a positive function of both employment opportunity in the non-agricultural sector and the expected earnings ratio of workers in the two sectors. The relationship is described in general form so that it is reduced to a negative function of food price, a negative function of non-agricultural work force and a positive function of employment.

$$(2) \quad \frac{dN}{dt} = \Pi [p, N, L]$$

$$\text{With } \frac{\partial \Pi}{\partial p} < 0, \quad \frac{\partial \Pi}{\partial N} < 0, \quad \frac{\partial \Pi}{\partial L} > 0$$

Non-agricultural sector's labour market is represented by:

$$(3) \quad \frac{dL}{dt} = m[L] - w [p]$$

$m [L]$ is the marginal product of labour, which is negatively related to employment variable ($\frac{\partial m}{\partial L} < 0$). Wage rate is positively or non-negatively related to food price ($\frac{\partial w}{\partial p} \geq 0$).

When linearized, Eq. (1), (2) and (3) are given by:

$$\text{From } \frac{dp}{dt} = 0 \quad a_{11}p + a_{12}N + a_{13}L = Z_1 \quad \text{for food}$$

$$(4) \quad \text{From } \frac{dN}{dt} = 0 \quad a_{21}p + a_{22}N + a_{23}L = Z_2 \quad \text{for migration}$$

$$\text{From } \frac{dL}{dt} = 0 \quad a_{31}p + a_{32}N + a_{33}L = Z_3 \quad \text{for employment}$$

where p , N , L are at equilibrium, and $a_{11} = \left(\frac{\partial D}{\partial p} - \frac{\partial S}{\partial p} \right) < 0$
marginal response of excess demand to food price

$$a_{12} = - \frac{\partial S}{\partial N} > 0 \quad \text{marginal effect of rural-urban migration on excess demand for food}$$

$$a_{13} = \frac{\partial D}{\partial L} > 0 \quad \text{marginal effect of non-agricultural employment on excess demand for food}$$

$$a_{21} = \frac{\partial \Pi}{\partial p} < 0 \quad \text{marginal effect of food price on rural-urban migration}$$

$$a_{22} = \frac{\partial \Pi}{\partial N} < 0 \quad \text{marginal effect of non-agricultural work force on rural-urban migration}$$

$$a_{23} = \frac{\partial \Pi}{\partial L} > 0 \quad \text{marginal effect of employment on rural-urban migration}$$

$$a_{31} = - \frac{\partial w}{\partial p} < 0 \quad \text{marginal effect of food price on excess demand for labour in the non-agricultural sector}$$

$$a_{32} = 0$$

$$a_{33} = \frac{\partial m}{\partial L} < 0 \quad \text{marginal effect of employment on marginal labour product}$$

$$Z_1 = F$$

$$Z_2 = 0$$

$$Z_3 = 0$$

Hicksian stability conditions are satisfied by:

$$\begin{aligned}
 & |\bar{a}_{11} + \bar{a}_{22} + \bar{a}_{33}| < 0, \\
 \Delta_{11} &= \begin{vmatrix} \bar{a}_{22} & \bar{a}_{23} \\ 0 & \bar{a}_{33} \end{vmatrix} > 0, \quad \Delta_{22} = \begin{vmatrix} \bar{a}_{11} & \bar{a}_{13} \\ \bar{a}_{31} & \bar{a}_{33} \end{vmatrix} > 0 \\
 \Delta_{33} &= \begin{vmatrix} \bar{a}_{11} & \bar{a}_{12} \\ \bar{a}_{21} & \bar{a}_{22} \end{vmatrix} > 0 \\
 \Delta &= \begin{vmatrix} \bar{a}_{11} & \bar{a}_{12} & \bar{a}_{13} \\ \bar{a}_{21} & \bar{a}_{22} & \bar{a}_{23} \\ \bar{a}_{31} & 0 & \bar{a}_{33} \end{vmatrix} < 0
 \end{aligned}$$

Microeconomic Justification

Microeconomic justification for Eq. (1) is given by:

$$\frac{dp}{dt} = LC \left[p, \frac{w}{p} \right] - \{Q - (\bar{N} - N)b\} - F$$

where C = average food consumption per worker
in the non-agricultural sector
 Q = food output
 b = average food consumption per worker in the agricultural
sector.

Demand (D) is expressed as product of employment (L) and average food consumption (C). Since the latter is defined to be a function of food price and wage rate which is positively affected by food price, demand is reduced to be a function of employment and price: $D = D[L, p]$.

Total differentiation of D is expressed by:

$$dD = CdL + \left\{ \frac{\partial C}{\partial p} + \left(\frac{e-1}{p} \right) \frac{w}{p} \frac{\partial C}{\partial \left(\frac{w}{p} \right)} \right\} L dp \quad \text{from } D = LC$$

Where $C = \frac{\partial D}{\partial L} > 0$ or $C = a_{13} > 0$

$\frac{\partial C}{\partial p} < 0$, food and non-food product are substitutes

$\frac{\partial C}{\partial (\frac{W}{p})} > 0$; propensity to consume food is positive and less than one

$e = \frac{\partial W/W}{\partial p/p} \leq 1$, by the non-excessive compensation assumption.

The brace-bracketed term on the r.h.s. expression for dD is negative because of $\frac{\partial C}{\partial p} < 0$ and $e \leq 1$. Therefore, we have: $\frac{\partial D}{\partial L} > 0$ and $\frac{\partial D}{\partial p} < 0$.

Marketable surplus (S) is the difference between food output (Q) and consumption within the agricultural sector ($(\bar{N} - N) b$). Output is a positive function of agricultural work force ($\frac{\partial Q}{\partial (\bar{N} - N)} > 0$) and a positive function of food price ($\frac{\partial Q}{\partial p} > 0$). The latter relation represents the possibility of an increased work effort per agricultural worker and increased use of non-labour inputs, excluding land which is fixed, when food price rises.

Average food consumption per agricultural worker (b) is a negative function of food price and a positive function of average income. It was assumed that every worker produces food at least as much as he consumes it: $\frac{\partial Q}{\partial (\bar{N} - N)} - b \geq 0$ or $\frac{\partial Q}{\partial N} + b \leq 0$. This results in $\frac{\partial S}{\partial N} < 0$.

Since Q is positively affected by p and b is negatively affected by p , S must be positively affected by p : $\frac{\partial S}{\partial p} > 0$.

When above results are collected, Eq. (1) is obtained:

$$\frac{dp}{dt} = D [p, L] - S [N, p] - F$$

with $\frac{\partial D}{\partial p} < 0$, $\frac{\partial D}{\partial L} = C > 0$,

$$\frac{\partial S}{\partial N} < 0, \quad \frac{\partial S}{\partial p} > 0.$$

The time-rate of rural-urban migration is assumed to be determined by the expected urban-rural income differential and the expected employment opportunity in the non-agricultural sector. Expected variables are considered to be positively determined by their realized values. The relationship is given in a general form:

$$\frac{dN}{dt} = \Pi [U, \phi]$$

$$\frac{\partial \Pi}{\partial U} < 0 \quad \text{and} \quad \frac{\partial \Pi}{\partial \phi} > 0.$$

Where $U =$ urban unemployment rate $\left(\frac{N-L}{N}\right)$

$\phi =$ urban-rural earnings ratio $\left(\frac{w}{y}\right)$

$$y = \frac{pQ}{N - N}$$

From definition of notations, it is clear $\frac{\partial U}{\partial L} < 0$ and $\frac{\partial U}{\partial N} > 0$. The average income per agricultural worker (y) is a decreasing (an increasing) function of agricultural (non-agricultural) work force for a relatively labour-abundant rural economy in LDC's:

$$\frac{\partial y}{\partial N} = \left\{ \frac{Q}{N - N} - \frac{\partial Q}{\partial (N - N)} \right\} \frac{p}{N - N} > 0.$$

This makes the urban-rural income ratio (ϕ) a decreasing function of non-agricultural work force:

$$\frac{\partial \phi}{\partial N} = - \frac{\phi}{y} \frac{\partial y}{\partial N} < 0.$$

The derivative of the income ratio with respect to food price is given by:

$$\frac{\partial \phi}{\partial p} = \left\{ \frac{e-1}{p} - \frac{\frac{\partial Q}{\partial p}}{Q} \right\} < 0$$

since $e \leq 1$ and $\frac{\partial Q}{\partial p} > 0$ by assumption.

When the above results are collected, the functional expression for rural-urban migration can be rewritten into a function of three basic variables (p, N, L):

$$\frac{dN}{dt} = \Pi [p, N, L]$$

with $\frac{\partial \Pi}{\partial p} < 0$, $\frac{\partial \Pi}{\partial N} < 0$, $\frac{\partial \Pi}{\partial L} > 0$

III

The model system can be used to analyse the employment effect of three policies: direct employment expansion by the government, wage subsidy to the private sector, and food price support. For each policy two cases are examined: one without dealing with how the policy is financed, and another with its spending being entirely financed by the proceeds of food imported under foreign food aid.

Notation G is the amount of resources appropriated in terms of non-food product for employment promotion purpose, and pF is the proceeds of foreign food, which is appropriated for the same purpose. For the sake of comparability, G and pF are assumed to be equal in amount.

Direct employment expansion by the government is the situation in which the government spends G to increase employment level, for instance in the social overhead sector. The program is described by:

$G = wL_2$, with $dG = w dL_2$ if G was zero prior to the application of the new policy. L_2 denotes the employment in the government-financed sector, and w denotes the ruling wage rate in terms of non-food product.

If the program is financed by the proceeds of foreign food aid the relationship becomes: $pF = wL_2$, with $pdF = w dL_2$ if originally F was zero.

Linear system Eq. (4) in the preceding section is rewritten in an incremental form to indicate equilibrium change:

$$(5) \quad Adx = dz.$$

where

$$A = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & 0 & a_{33} \end{vmatrix}$$

$$dx = \begin{vmatrix} dp \\ dN \\ dL \end{vmatrix} ; dL = dL_1 + dL_2$$

$$dz = \begin{vmatrix} dF \\ 0 \\ 0 \end{vmatrix}, dL_1 = \text{employment change in the private sector}$$

Assume for mathematical simplicity that prior to the application of employment policies F and G were both zero's. Policies are newly being introduced.

When $dL_2 = \frac{dG}{w}$ and $dL_2 = \frac{pdF}{w}$ are substituted for dL_2 in Eq. (5), the shift vector (dz) becomes:

$$dz = \begin{vmatrix} \frac{-C}{w} dG & (\frac{-pC}{w} + 1) dF \\ \frac{-a_{23}}{w} dG & \frac{-pa_{23}}{w} dF \\ 0 & 0 \end{vmatrix}$$

where $C = a_{13}$. The system can be solved for $\frac{dp}{dG}$, $\frac{dN}{dG}$, $\frac{dL}{dG}$ and $\frac{dp}{pdF}$, $\frac{dN}{pdF}$, $\frac{dL}{pdF}$.

Wage subsidy policy can be described by $G = gL$; where $G = \text{total subsidy outlay}$, $g = \text{the amount of subsidy per employee in the non-agricultural sector}$. When G was zero prior to the application of the new policy, the expression becomes: $dG = L dg$. If the subsidy is financed by the proceeds of foreign food aid the policy becomes: $pF = gL$, with $pdf = Ldg$ when F was zero originally.

Substitution of these expressions for dg (i.e., $dg = \frac{dG}{L}$ and $dg = \frac{pdF}{L}$) into Eq. (5) with an inclusion of wage subsidy (g) in employment equation ($\frac{dL}{dt} = 0$), yields the following shift vectors (dz):

$$dz = \begin{vmatrix} 0 & dF \\ 0 & 0 \\ -\frac{dG}{L} & -\frac{pdF}{L} \end{vmatrix}$$

No distinction is necessary in this case between government sector employment and private sector employment. For government does not directly change employment in this case.

Price support policy can be described by the following expression:

$$G = (p^* - p) S [N, p^*].$$

When source of finance is ignored;

$$pF = (p^* - p) S [N, p^*],$$

when source of finance is foreign food aid.

where $p^* > p$

p^* = producer food price

p = consumer food price

S = marketable surplus of food,

with $\frac{\partial S}{\partial N} < 0$ and $\frac{\partial S}{\partial p^*} > 0$ as defined in microeconomic justification.

With the assumption that prior to the application of the policies G and pF were zero's, the policies are described by:

$$dG = Sdp^* - Sdp$$

$$pdF = Sdp^* - Sdp$$

When these are substituted into Eq. (5), the shift vectors become:

$$dz = \begin{vmatrix} \frac{\partial S}{\partial p} \frac{dG}{S} & (1 + \frac{p}{S} \frac{\partial S}{\partial p}) dF \\ -\frac{\partial \Pi}{\partial p} \frac{dG}{S} & -\frac{\partial \Pi}{\partial p} \frac{p}{S} dF \\ 0 & 0 \end{vmatrix}$$

where $\frac{\partial \Pi}{\partial p} = a_{21} < 0$

Complete solutions for each policy are presented below:

Wage Subsidy Policy

with $dF = 0$

$$\frac{dp}{dG} = \frac{-(a_{12} \ a_{23} \ -a_{13} \ a_{22})}{L\Delta} > 0$$

$$(6) \ \frac{dN}{dG} = \frac{(a_{11} \ a_{23} \ -a_{13} \ a_{21})}{L\Delta} \approx 0$$

$$\frac{dL}{dG} = \frac{-(a_{11} \ a_{22} \ -a_{12} \ a_{21})}{L\Delta} > 0$$

with $dF > 0$

$$\frac{dp}{pdF} = \frac{dp}{dG} + \frac{a_{22} \ a_{33}}{p\Delta} \approx 0$$

$$\frac{dN}{pdF} = \frac{dN}{dG} - \frac{(a_{21} \ a_{33} \ -a_{23} \ a_{31})}{p\Delta} \approx 0$$

$$\frac{dL}{pdF} = \frac{dL}{dG} - \frac{a_{22} \ a_{31}}{p\Delta} > 0$$

$$\text{where } \Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & 0 & a_{33} \end{vmatrix} < 0;$$

$$a_{11} < 0, \ a_{12} > 0, \ a_{13} > 0$$

$$a_{21} < 0, \ a_{22} < 0, \ a_{23} > 0$$

$$a_{31} < 0, \ a_{33} < 0$$

Direct Employment Policy

with $dF = 0$

$$\frac{dp}{dG} = \frac{(a_{12} \ a_{23} \ -a_{13} \ a_{22}) \ a_{33}}{w\Delta} > 0$$

$$(7) \ \frac{dN}{dG} = \frac{(a_{13} \ a_{21} \ -a_{11} \ a_{23}) \ a_{33}}{w\Delta} \approx 0$$

$$\frac{dL_1}{dG} = \frac{(a_{13} \ a_{22} \ -a_{12} \ a_{23}) \ a_{31}}{w\Delta} < 0$$

$$\frac{dL}{dG} = \frac{(a_{11} \ a_{22} \ -a_{12} \ a_{21}) \ a_{33}}{w\Delta} > 0$$

$$\frac{dL}{dG} = \frac{1}{w} \text{ if } a_{31} = 0$$

with $dF > 0$

$$\frac{dp}{pdF} = \frac{dp}{dG} + \frac{a_{22} \ a_{33}}{p\Delta} \approx 0$$

$$\frac{dN}{pdF} = \frac{dN}{dG} - \frac{(a_{21} \ a_{33} \ -a_{23} \ a_{31})}{p\Delta} > 0$$

$$\frac{dL_1}{pdF} = \frac{dL_1}{dG} - \frac{a_{22} \ a_{31}}{p\Delta} \approx 0$$

$$\frac{dL}{pdF} = \frac{dL}{dG} - \frac{a_{22} \ a_{31}}{p\Delta} > 0$$

Price Support Policy

with $dF = 0$

$$\frac{dp}{dG} = \frac{\frac{\partial S}{\partial p} + (a_{22} a_{21} + a_{12} a_{21}) a_{33}}{S \Delta} < 0$$

with $dF > 0$

$$\frac{dp}{pdF} = \frac{dp}{dG} + \frac{a_{22} a_{33}}{p \Delta} < 0$$

$$\frac{dN}{dG} = \frac{(a_{23} \frac{\partial S}{\partial p} + a_{13} a_{21}) a_{31} - (a_{11} a_{21} + a_{21} \frac{\partial S}{\partial p}) a_{33}}{S \Delta} \approx 0$$

$$(8) \quad \frac{dN}{pdF} = \frac{dN}{dG} - \frac{(a_{21} a_{33} - a_{23} a_{31})}{p \Delta} \approx 0$$

$$\frac{dL}{dG} = \frac{-(a_{12} a_{21} + a_{22} \frac{\partial S}{\partial p}) a_{31}}{S \Delta} > 0 \quad \frac{dL}{pdF} = \frac{dL}{dG} - \frac{a_{22} a_{31}}{p \Delta} > 0$$

$$\frac{dp^*}{dG} = \frac{1}{S} + \frac{dp}{dG} > 0 \quad \frac{dp^*}{pdF} = \frac{1}{S} + \frac{dp}{pdF} \approx 0$$

where $\frac{\partial S}{\partial p} > 0$; $dL = dL_1 + dL_2$; $C = a_{13}$

Examination of these solutions provides some interesting findings:

1) Wage subsidy and direct employment policies are similar in their effect on food price ($\frac{dp}{dG} > 0$), direction of migration ($\frac{dN}{dG} \approx 0$), and employment ($\frac{dL}{dG} > 0$). In fact, both policies become quantitatively equivalent to each other in terms of their policy effects if $\frac{-a_{33} L}{w} = 1$, where $a_{33} = \frac{\partial m [L]}{\partial L} < 0$. This is the case when the marginal product of labour in the non-agricultural sector is unitarily elastic with respect to employment. The elasticity of marginal labour product with respect to employment ($\frac{-a_{33} L}{w} > 0$) is expected to be relatively large in an economy in which substitutability between labour and non-labour inputs is significantly limited. In terms of employment effect, wage subsidy policy has a stronger (weaker) positive effect than direct

employment policy if the elasticity is less (larger) than unitary.

That is, $\frac{dL}{dG}|_{ws} \approx \frac{dL}{dG}|_{DE} > 0$ and $\frac{dp}{dG}|_{ws} \approx \frac{dp}{dG}|_{DE} > 0$ according to $\frac{-a_{33} L}{W} \lesssim 1$, where suffix ws refers to the wage subsidy policy and DE refers to the direct employment policy.

2) The size of a_{33} does not affect the numerators of the expressions for wage subsidy effects, but it affects the numerators for direct employment policy effects. If $a_{33} = 0$, direct employment policy cannot influence the total employment of the non-agricultural sector at all. Nor can the policy influence the direction of migration nor the food price if $a_{33} = 0$. The direct employment ($dL_2 = \frac{dG}{W}$) created by the government is completely off set by the same amount of reduction in employment that occurs in the private sector: $dL_1 = \frac{-dG}{W} < 0$. This result arises from the perfect crowding effect of limited food supply in relation to employment expansion. The crowding effect is nil when $a_{31} = 0$; the total employment effect is equal to the initial increase in government sector's employment: $dL = dL_2 = \frac{dG}{W}$. This is indeed the maximum employment effect that can be achieved by the direct employment policy; total employment effect will be less than dL_2 if $a_{31} < 0$.

3) Price support policy is both dissimilar and similar in its effect to the other two policies. Whilst producer price rises ($\frac{dp^*}{dG} > 0$), consumer price falls ($\frac{dp}{dG} < 0$) when price support policy is applied. Direction of migration is uncertain ($\frac{dN}{dG} \gtrsim 0$), and employment increases ($\frac{dL}{dG} > 0$) as in the two other policies. However, the positive employment effect of price support policy depends quantitatively on the pro-price wage flexibility ($a_{31} < 0$). If $a_{31} = 0$, the employment effect becomes zero ($\frac{dL}{dG} = 0$). Price effect ($\frac{dp}{dG} < 0$ and $\frac{dp^*}{dG} > 0$) remains independent of a_{31} . With $a_{31} = 0$,

the rural-urban migration is reversed in its direction:

$$\frac{dN}{dG} = \frac{-(a_{11} + \frac{\partial S}{\partial p}) a_{21} a_{33}}{S\Delta} < 0$$

since $a_{11} + \frac{\partial S}{\partial p} = \frac{\partial D}{\partial p} < 0$.

In the special case of $a_{31} = 0$, food output is likely to be positively affected by the price support policy, for food output is defined to be a positive function of both producer food price which rises and agricultural work force which increases due to the reversal of rural-urban migration.

On the other hand, if $a_{33} = 0$ and $a_{31} > 0$, price support policy cannot affect consumer food price ($\frac{dp}{dG} = 0$), although producer price is still pulled up ($\frac{dp^*}{dG} > 0$) by the policy. Employment increases but direction of migration remains uncertain.

4) The above findings stress the importance of knowledge about the magnitudes of a_{31} and a_{33} in designing policies. In the likelihood of such knowledge not being available in a typical developing economy, neither the direct employment policy nor the price support policy seems to be a reliable policy for employment promotion purposes. Employment effects may merely be zero in the critical situation such as $a_{33} = 0$ for direct employment policy and $a_{31} = 0$ for price support policy.

Wage subsidy policy does not require a_{31} and a_{33} to be non-zero for it to be effective in employment promotion. In the world of uncertainty, wage subsidy policy would be preferable to the other two policies, at least, in terms of employment impacts.

5) Foreign food aid has remarkably the same quantitative effect in all

three policies: it dampens the price rise ($\frac{a_{22} a_{33}}{p\Delta} < 0$), accelerates the rural-urban migration ($-\frac{(a_{21} a_{33} - a_{23} a_{31})}{p\Delta} > 0$), and increases employment ($\frac{-a_{22} a_{31}}{p\Delta} > 0$).

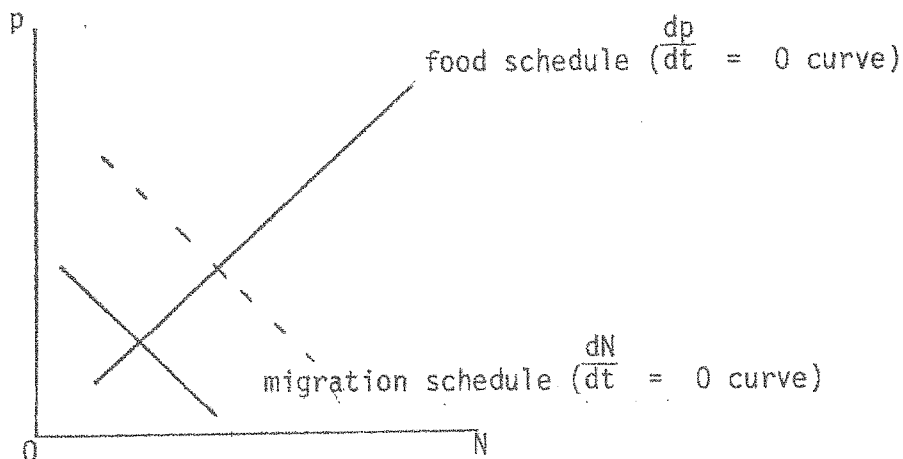
Because of the price-dampening effect of foreign food aid

($\frac{a_{22} a_{33}}{p\Delta} < 0$), the price effect of both wage subsidy and direct employment policies becomes indeterminate in its direction ($\frac{dp}{pdF} \gtrless 0$) when foreign food aid is used to finance these policies. Nonetheless, a rise in food price remains a distinct possibility even in this situation: Food price may rise despite food aid, which is a price-depressing factor, if the employment (positive) effect of its utilization is stronger than its supply effect.

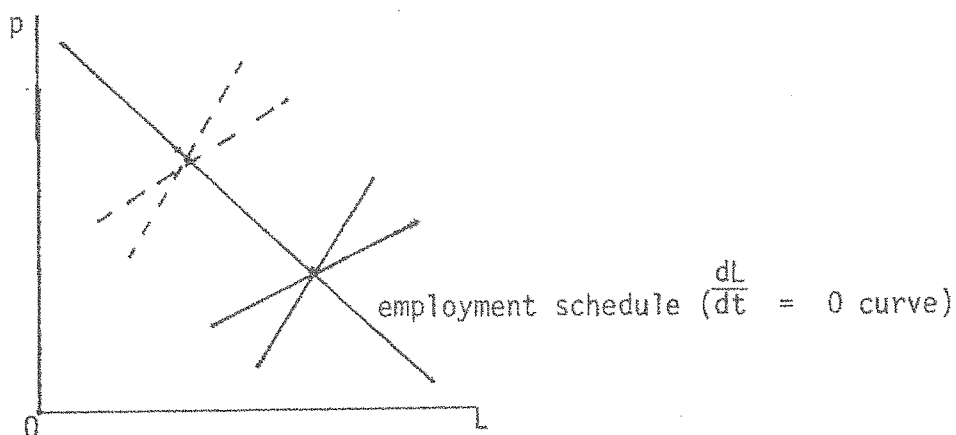
For instance, the government may distribute C amount of food (the average food consumption per non-agricultural worker) to the urban poor: $CL_2 = F$, where L_2 = the number of the poor receiving food distribution. In incremental terms, it becomes $CdL_2 = dF$, if $F = 0$ originally.

The aspiring rural migrants may interpret the free distribution of food to the urban poor as an improvement in their survival chance if they actually migrate. dL_2 in this case can have the same effect as an increase in urban employment: $\frac{\partial \Pi}{\partial L_2} dL_2 > 0$. Migration is stimulated; the migration schedule shifts upwards on the p - N plane.

If $CdL_2 = dF$ is wholly consumed by the urban poor for their subsistence, the same amount will enter into both demand and supply terms in Eq. (1) to cancel each other in their effect on excess demand for food. Food schedule remains constant on the p - N plane.



At a new equilibrium, food price is higher and rural-urban migration has taken place. Because of the resulting higher price of food the non-agricultural employment is adversely affected; unemployment rises. On the p - L plane,



equilibrium point moves along the existing employment schedule in the north-western direction.

6) For all three policies the unemployment of the economy declines (increases) if $(a_{22} + a_{23}) a_{11} - (a_{12} + a_{13}) a_{21}$ is positive (negative), as can be confirmed by deriving the expression for $\frac{dL}{dG} - \frac{dN}{dG}$ for each policy. The expression is positive if the absolute size of $a_{22} = \frac{\partial \pi}{\partial N}$ and $a_{23} = \frac{\partial \pi}{\partial L}$ are sufficiently close. In all likelihood, these coefficients are expected to be close enough, and also the remaining terms $(-(a_{12} + a_{13}) a_{21} > 0)$ are all positive. Therefore, unemployment is

expected to decline if any of the three policies is applied.

- 7) The positive effect ($\frac{-a_{22} a_{31}}{p\Delta} > 0$) of foreign food aid on employment is dependent upon pro-food price flexibility of wage rate ($a_{31} \leq 0$). If $a_{31} = 0$, employment is not affected by foreign food aid.

Foreign food aid always induces a rural-urban migration

($\frac{-(a_{21} a_{33} - a_{23} a_{31})}{p\Delta} > 0$), provided that labour market constraint is binding, i.e., not both a_{31} and a_{33} are zero. The inducement for migration is injected by the price-dampening ($\frac{a_{22} a_{33}}{p\Delta} < 0$) which lowers the average agricultural income per worker and the positive employment effect ($\frac{-a_{22} a_{31}}{p\Delta} > 0$) which improves employment opportunity. Implication is that food aid will result in a reduction in the domestic food output through its rural-urban migration effect and also through its price effect on output if the latter effect is negative:

$$dQ = \frac{\partial Q}{\partial N} dN + \frac{\partial Q}{\partial p} dp < 0 \text{ if } dN > 0 \text{ and } dp < 0,$$

where $\frac{\partial Q}{\partial N} < 0$ and $\frac{\partial Q}{\partial p} > 0$.

The policy effect captured by Eq. (6), (7) and (8) have some macro-economic relevance. Suppose that the government attempts to improve the country's employment situation by resorting to deficit-spending. In addition to the usual macroeconomic pressures such as inflation, the the employment policy is expected to create impacts on the endogenous variables, depending on which particular policy option (direct employment expansion, wage subsidy, or price support) is used, exactly in the same way as described by Eq. (6), (7) and (8). Thus, our method provides policy-makers a convenient tool of examining two-sectoral impacts of macroeconomic policies beforehand.

A general illustration would be the case when the governments' expansionary policy resulted in an increase in demand for non-food product. Let dM denote the initial increased demand arising from such policy. As a result of the increased demand for non-food product, $dL_2 = \lambda dM$ additional employment is required in the non-agricultural sector, where λ denotes employment/output ratio.

Each of the additionally employed receives ruling wage rate w , and consumes C amount of food (ruling average food consumption). The shift vector in Eq. (5) becomes:

$$dz = \begin{vmatrix} -C & \lambda dM \\ -a_{23} & \lambda dM \\ 0 & \end{vmatrix}, \quad \text{where } C = a_{13}, \quad \frac{\partial \Pi}{\partial L} = a_{23}$$

Solutions are given by:

$$\frac{dp}{dM} = \frac{(a_{12} a_{23} - a_{13} a_{22}) \lambda a_{33}}{\Delta} > 0$$

$$\frac{dN}{dM} = \frac{-(a_{11} a_{22} - a_{12} a_{21}) \lambda a_{23}}{\Delta} > 0$$

$$\frac{dL_1}{dM} = \frac{(-a_{12} a_{22} + a_{13} a_{22}) \lambda a_{23}}{\Delta} < 0$$

where dL_1 = secondary change in employment

$$\frac{dL}{dM} = \frac{(a_{11} a_{22} - a_{12} a_{21}) \lambda a_{23}}{\Delta} > 0; \quad \frac{dL}{dM} = \lambda \text{ if } a_{23} = 0$$

where $dL = dL_1 + dL_2$.

These solutions are exactly the same, except for proportionality factor λ , as solutions for direct employment policy, which has $\frac{1}{w}$ as proportionality factor.

This illustration demonstrates the usefulness of our model for translating macroeconomic policy effects into two-sectoral effects on food price, rural-urban migration, urban employment, and food output, etc.

The impacts of foreign trade also can easily be analyzed by using the results obtained for foreign food aid. Redefine F as the physical amount of food imported, and write the balance of trade equation as: $p_x X = p_a F$, where p_x = the export price of non-food product, X = the physical amount of non-food product exported, p_a = the import price of food. For a small developing economy p_a and p_x are given data, and for simplicity assume that X is constant.

The quantity of food imported changes if either of the two prices or the quantity of non-food product exported changes:

$$\begin{aligned} X dp_x &= p_a dF && \text{if } p_x \text{ changes} \\ 0 &= F dp_a + p_a dF && \text{if } p_a \text{ changes} \\ dX p_x &= p_a dF && \text{if } X \text{ changes} \end{aligned}$$

The impacts of these changes on domestic food price, rural-urban migration, and employment are derived by simply multiplying through the effects described by Eq. (6), (7) and (8) by the following factors:

$$\frac{pX}{p_a} > 0 \quad \text{for change in } p_x$$

$$\frac{-pF}{p_a} < 0 \quad \text{for change in } p_a$$

$$\frac{pp_x}{p_a} > 0 \quad \text{for change in } X$$

For example, the employment effect becomes:

$$\frac{dL}{dp_x} = \frac{pX}{p_a} \frac{dL}{pdF}; \quad \frac{dL}{pdF} \quad \text{from Eq. (6), (7) and (8)}$$

$$\frac{dL_1}{dp_x} = \frac{pX}{p_a} \frac{dL_1}{pdF}; \quad \frac{dL_1}{pdF} \quad \text{from Eq. (7)}$$

$$\frac{dL}{dp_a} = -\frac{pF}{p_a} \frac{dL}{pdF}; \quad \text{the same as above}$$

$$\frac{dL_1}{dp_a} = -\frac{pF}{p_a} \frac{dL_1}{pdF}; \quad \text{the same as above}$$

$$\frac{dL_1}{dX} = \frac{pp_x}{p_a} \frac{dL_1}{pdF}; \quad \text{the same as above}$$

$$\frac{dL}{dX} = \frac{pp_x}{p_a} \frac{dL}{pdF}; \quad \text{the same as above}$$

V

Technological progress or the effect of non-labour inputs can be introduced into the model through the following modification:

$$\frac{dL}{dt} = m [L, T] - w [p], \quad T = \text{technology index, for technological}$$

factor in the non-agricultural sector, and

$$\frac{dp}{dt} = D - S [p, N, R]$$

$$\frac{dN}{dt} = \pi [p, N, L, R], \quad R = \text{technology index in agriculture,}$$

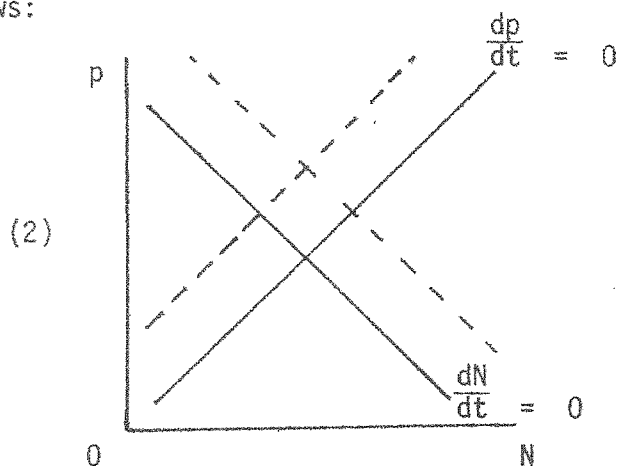
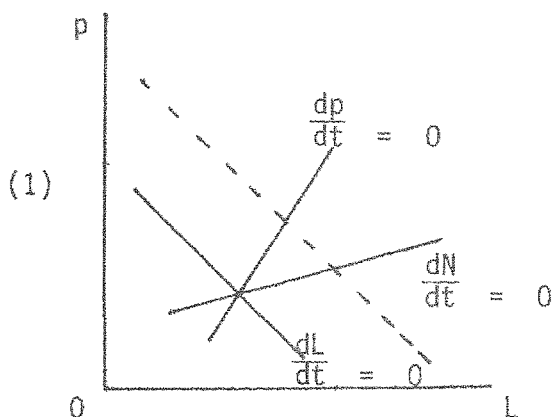
for the agricultural sector.

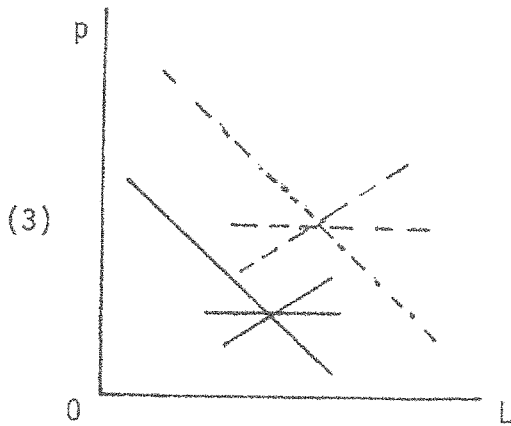
Direct impacts of progress are defined to be: $\frac{\partial m}{\partial T} > 0$, $\frac{\partial S}{\partial R} > 0$, $\frac{\partial \pi}{\partial R} < 0$.

The sign of $\frac{\partial \pi}{\partial R}$ is negative because of the positive effect the technological progress having on the average agricultural income. Shift vectors of the system become:

$$dz = \begin{vmatrix} 0 & \frac{\partial S}{\partial R} dR \\ 0 & -\frac{\partial \pi}{\partial R} dR \\ -\frac{\partial m}{\partial T} dT & 0 \end{vmatrix}$$

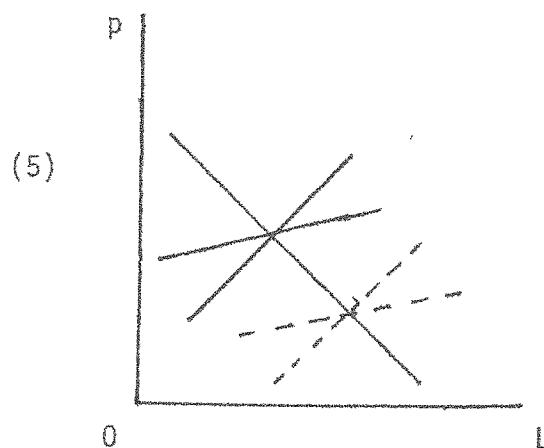
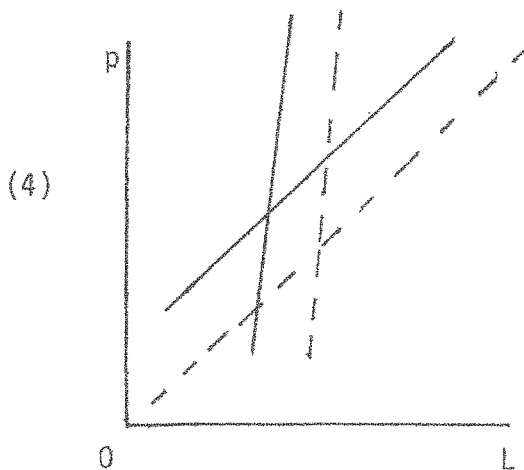
The effects of these shifts on food price, migration and employment are described diagrammatically as follows:



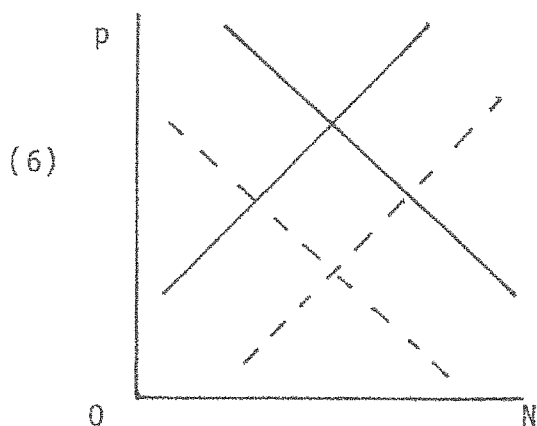


Technological progress ($\frac{\partial m}{\partial T} dT > 0$) in the non-agricultural sector shifts employment schedule ($\frac{dL}{dT} = 0$ curve) upwards on the p-L plane (diagram (1)). Other things being equal, employment must increase in the same sector. This increase in employment causes a shift in food schedule ($\frac{dp}{dT} = 0$ curve) and migration schedule ($\frac{dN}{dT} = 0$ curve) respectively upwards (diagram (2)). Price is pushed up by the upward shift of these two schedules. At a new equilibrium on the p-L plane (diagram (3)), food price is higher and employment is larger, but on the p-N plane (diagram (2)) it is not clear whether the direction of migration is from agriculture to non-agriculture or the other way around.

Other things being equal technological progress in the agricultural sector causes a downward shift in both food schedule and migration schedule on the p-L plane (diagram (4)).



Due to the shift, food price is lowered and employment is increased (diagram (5)). On the p - N plane, a downward shift occurs in both food schedule (due to $\frac{\partial S}{\partial R} dR > 0$) and migration schedule (due to $\frac{-\partial \Pi}{\partial R} dR > 0$). At equilibrium food price is lower, but the direction of migration is not clear (diagram (6)).



The above explanation demonstrates the convenience of using diagrams for analyzing policy effects. Precise mathematical solutions are derived below:

Technological progress in the non-agricultural sector

$$\frac{dp}{dT} = \frac{-(a_{12} a_{23} - a_{13} a_{22}) \frac{\partial m}{\partial T}}{\Delta} > 0$$

$$(9) \quad \frac{dN}{dT} = \frac{-(a_{11} a_{23} - a_{13} a_{21}) \frac{\partial m}{\partial T}}{\Delta} \lessgtr 0$$

$$\frac{dL}{dT} = \frac{-(a_{11} a_{22} - a_{12} a_{21}) \frac{\partial m}{\partial T}}{\Delta} > 0$$

Technological progress in the agricultural sector

$$(10) \quad \frac{dp}{dR} = \frac{(a_{22} \frac{\partial S}{\partial R} + a_{12} \frac{\partial \Pi}{\partial R}) a_{33}}{\Delta} < 0$$

$$\frac{dN}{dR} = \frac{(a_{23} \frac{\partial S}{\partial R} + a_{13} \frac{\partial \Pi}{\partial R}) a_{31} - (a_{11} \frac{\partial \Pi}{\partial R} + a_{21} \frac{\partial S}{\partial R}) a_{33}}{\Delta} > 0$$

$$\frac{dL}{dR} = \frac{-(a_{22} \frac{\partial S}{\partial R} + a_{12} \frac{\partial \Pi}{\partial R}) a_{31}}{\Delta} > 0$$

Solutions for the non-agricultural sector's (Eq. (9)) technological progress are exactly the same as solutions for wage subsidy policy (Eq.(6)), except for the proportional factor $\frac{\partial \Pi}{\partial T} > 0$.

Solutions for the agricultural sector's (Eq. (10)) technological progress are exactly the same as solutions for price support policy (Eq. (8)), except that in the former $\frac{\partial S}{\partial p}$ and $\frac{\partial \Pi}{\partial p} = a_{21}$ are replaced with $\frac{\partial S}{\partial R}$ and $\frac{\partial \Pi}{\partial R}$.

Technological progress in the agricultural sector cannot affect employment in the non-agricultural sector if $a_{31} = 0$. But if $a_{31} < 0$, employment increases ($\frac{dL}{dR} > 0$) since the wage rate falls in response to a fall in food prices.

When productivity improvement occurs in both sectors in a balanced way, non-agricultural employment can increase significantly because non-agricultural employment is positively affected by technological progress in both sectors other than in the limiting core where $a_{31} = 0$. Effects of technological progress on food prices are opposite between the two sectors so that stable food price can be maintained if progress is balanced between the two sectors. Unemployment may be reduced by the employment improvement, especially since the direction of migration is not clear when technological progress occurs in both sectors.

REFERENCES

Abbott, P.C. and McCarthy, F.D., 1982, "Welfare Effects of Tied Food Aids", Journal of Development Economics, 2, pp. 63-79.

Abbott, P.C., "Modelling International Grain Trade with Government Controlled Markets", American Journal of Agricultural Economics, Vol. 61, No. 1, February 1979, pp. 22-31.

Bhagwati, J. and Srinivasan, T.N., 1974, "On Reanalyzing the Harris-Todaro model: Policy Rankings in the case of Sector Specific Sticky wages", American Economic Review, Vol. 64, pp. 502-508.

Corden, W. and Findlay, R., 1975, "Urban Unemployment, Inter-Sectoral capital mobility and Development Policy", Economica, Vol. 42, February, pp. 59-78

Deaton, B.J., 1980, "Public Law 480: The Critical Choices", American Journal of Agricultural Economics, 62, pp. 988-992.

Fisher, F.M., 1963, "A Theoretical Analysis of the Impact of Food Surplus Disposal on Agricultural Production in Recipient Countries", Journal of Farm Economics, 45, pp. 863-875.

- Hall, L.L., 1980, "Evaluating the Effects of P.L. 480 Wheat Imports on Brazil's Grain Sector", American Journal of Agricultural Economics, Vol. 62, No. 1, February, pp. 19-28.
- Isenman, P.J. and Singer, H.W., 1977, "Food Aid: Disincentive Effects and their Policy Implications", Economic Development and Cultural Change, 2, pp. 205-237.
- Mann, J.S., 1968, "The Impact of Public Law 480 Imports on Prices and Domestic Supply of Cereals in India", American Journal of Farm Economics, 49, February.
- Mellor, J.W., 1974, "Models of Economic Growth and Land Augmenting Change in Food Production", in Islam, N. (ed.), Agricultural Policy in Developing Countries, pp. 6-14.
- Mussa, M., 1974, "Tariffs and the Distribution of Income: The Importance of Factor Specificity, Substitution, and Intensity in the Short and Long Run", Journal of Political Economy, Vol. 82, Nov./Dec., pp. 1191-1203.
- Neary, J.P., 1981, "On the Harris-Todaro model with Intersectoral capital mobility", Economica, Vol. 48, August, pp. 219-234.
- Peterson, W.L., 1979, "International Farm Prices and the Social Cost of Cheap Food Policies", American Journal of Agricultural Economics, Vol. 61, No. 1, February, pp. 12-21.

- Rogers, K.P., Srivastva, U.K., and Heady, E.O., 1972, "Modified Price, Production and Income Impacts of Food Aid Under Market Differentiated Distribution", American Journal of Agricultural Economics, May, 54, pp. 201-208.
- Schultz, T.W., 1960, "Value of U.S. Farm Surpluses to Underdeveloped Countries", Journal of Farm Economics, 4, pp. 1019-1030.
- Srinivasan, T.N. and Bhagwati, J., 1975, "Alternative Policy Rankings in a Large, Open Economy with Sector-Specific, Minimum wages", Journal of Economic Theory, Vol. 11, pp. 356-371.
- Todaro, M. and Harris, J., 1970, "Migration, Unemployment and Development: a Two Sector Analysis", American Economic Review, Vol. 60, March, pp. 126-42.

Working Papers in Economics

- * 1 I.G. Sharpe A Framework for Analysis of the Money Supply Process in Australia, March 1975
- * 2 I.G. Sharpe
R.G. Walker Asset Revaluation and Stock Market Prices, June 1975
- * 3 N.V. Lam Incidence and Stabilization Impact of Tin Export Taxation in West Malaysia, June 1975
- * 4 V.B. Hall &
M.L. King Inflationary Expectations in New Zealand: A Preliminary Study, August 1975
- * 5 A.J. Phipps Strike Activity and Inflation in Australia, September 1975
- * 6 N.V. Lam Incidence of the Rice Export Premium in Thailand, December 1975
- * 7 I.G. Sharpe Secondary Reserve Requirements, the Monetary Base and the Money Supply in Australia, January 1976
- * 8 P. Saunders Labour Demand Functions and the Quasi-Fixity Hypothesis: Some Empirical Results for U.K. Manufacturing Industries, 1963-1970, September 1976
- * 9 W.P. Hogan Economic Strategies for Recovery, November 1976
- *10 T.P. Truong Asset Revaluations and Share Prices: A Study using the M.S.A.E. Regression Technique, February 1977
- *11 S. Kim Instability of Primary Exports, Income Stabilization Policies and Welfare, February 1977
- *12 I.G. Sharpe &
P.A. Volker Institutional Change, Specification Error, Inflation and the Stability of the Demand for Money Function in the United States, 1901-1974, February 1977
- *13 I.G. Sharpe &
P.A. Volker The Impact of Institutional Changes on the Australian Short-Run Money Demand Function, February 1977
- *14 W.P. Hogan The Connections Between Foreign Trade and Economic Development: An Empirical Study, May 1977
- *15 F. Gill The Case of the Black Exodus from the Southern U.S., 1910-1970: Some Lessons for Theory and Applied Theory, May 1977
- *16 A.J. Phipps The Impact of Wage Indexation on Wage Inflation and Strike Activity in Australia, June 1977
- *17 V.B. Hall Pricing Behaviour in Australia: A Data Evaluation Study, June 1977
- *18 I.G. Sharpe Australian Money Supply Analysis: Direct Controls and the Relationship Between the Monetary Base, Secondary Reserves and the Money Supply, June 1977
- *19 L. Haddad Economic Systems: Towards a New Classification, June 1977
- 20 G. Lewis A Strategy for Winning at Roulette, July 1977
- 21 R.L. Brown A Test of the Black and Scholes Model of Option Valuation in Australia, November 1977
- *22 V.B. Hall Pricing Behaviour in Australian Manufacturing Industry: Hypothesis Testing 1955-1956 to 1967-1968, November 1977
- *23 I.G. Sharpe &
P.A. Volker The Selection of Monetary Policy Instruments: Evidence from Reduced Form Estimates of the Demand and Supply of Money in Australia, December 1977
- *24 V.B. Hall Excess Demand and Expectations Influences on Price Changes in Australian Manufacturing Industry, February 1978
- *25 I.G. Sharpe &
P.A. Volker The Tradeoff Between Improved Monetary Control and Market Interest Rate Variability in Australia: An Application of Optimal Control Techniques, February 1978
- *26 Evan Jones with
the assistance
of Mary MacDonald An Examination of Earnings Differentials in Australian Manufacturing Industry, June 1978
- 27 W.P. Hogan Questions on Structural Adjustment Policies, September 1978
- *28 P. Saunders Price and Cost Expectations in Australian Manufacturing Firms, February 1979
- *29 W.P. Hogan,
I.G. Sharpe &
P.A. Volker Regulation, Risk and the Pricing of Australian Bank Shares 1957-76, April 1979
- 30 W.P. Hogan Quicksands of Policy-Making, March 1979

- *31 C. Emerson Taxing Natural Resources Projects, May 1979
- 32 R.W. Bailey, V.B. Hall & P.C.B. Phillips A Small Model of Output, Employment, Capital Formation and Inflation, Applied to the New Zealand Economy, May 1979
- 33 W.P. Hogan Eurofinancing: Currencies, Loans and Bonds, December 1979
- 34 S. Adee The Growth of Foreign Investment and Economic Nationalism in Post Independence Ghana: 1967-1975, January 1980
- *35 W.P. Hogan The 40 Per Cent Investment Allowance, January 1980
- *36 W.P. Hogan Controlling Eurofinance Markets, December 1979
- 37 R.T. Ross Disaggregate Labour Supply Functions for Married Women: Preliminary Estimates For New Zealand, April 1980
- 38 U.R. Kohli Beginning and End-of-Period Specifications of Asset Market Equilibrium in Balance-of-Payments Theory, April 1980
- 39 G. Mills Government Incentive Contracts with Private Companies: Some Lessons from the Channel Tunnel, April 1980
- 40 C.G.F. Simkin Closer Economic Relations Between Australia and New Zealand, June 1980
- 41 U.R. Kohli Relative Price Effects and the Demand for Imports, July 1980
- 42 W.J. Merrilees Alternative Models of Apprentice Recruitment: With Special Reference to the British Engineering Industry, August 1980
- *43 P. Saunders Price Determination in Australian Manufacturing Firms: A Cross-Section Study, August 1980
- *44 W.P. Hogan Immigration Policies and Issues, October 1980
- 45 W.J. Merrilees Labour Market Segmentation in Canada: A Translog Approach, October 1980
- 46 W.J. Merrilees Pricing Strategies in the Newspaper Industry, November 1980
- 47 J.L. Whiteman The Micro-Foundations of Layoffs and Labour-Hoarding, November 1980
- 48 U.R. Kohli On the Duality between Fixed and Flexible Exchange Rates, November 1980
- 49 U.R. Kohli Nonjoint Technologies, December 1980
- 50 P. Saunders Price Determination, Expectations Formation and Some Tests of the Rationality of Australian Price Expectations, March 1981
- 51 J.L. Whiteman Rational Choice, Learning-by-Doing and the Personal Distribution of Income, April 1981
- 52 J.L. Whiteman Firm-Specific Human Capital, Experience and the Differential Incidence of Unemployment, April 1981
- 53 J. Yates An Analysis of Asset Holdings in Australia by Income Class, May 1981
- 54 J. Yates An Analysis of the Distributional Impact of Imputed Rent Taxation, June 1981
- 55 G. Mills Investment in Airport Capacity - A Critical Review of the MANS Study, January 1982
- 56 V.B. Hall & P. Saunders Pricing Models in Australian Manufacturing: The Evidence from Survey Data, January 1982
- 57 P. Saunders How Rational are Australian Price Expectations? January 1982
- 58 F. Gill The Costs of Adjustment and the Invisible Hand with Special Reference to the Labour Market, February 1982
- 59 G. Mills & W. Coleman Peak Load Pricing and the Channel Tunnel: A Re-Examination, March 1982
- 60 J. Yates Access to Housing Finance and the Campbell Report: The Implications of Implementing the Recommendations of Chapter 37, July 1982
- 61 S.S. Joson The Gatt Agreement on Government Procurements: Canada and Australia, July 1982
- *62 R.T. Ross General Report of the 1980 Survey of Work Patterns of Married Women in the Sydney Metropolitan Region, July 1982
- 63 W.J. Merrilees Pension Benefits and the Decline in Elderly Male Labour Force Participation, September 1982
- *64 W.P. Hogan Industry, Employment and Inflation, October 1982

- *65 A.J. Phipps Australian Unemployment: Some Evidence from Industry Labour Demand Functions, November 1982
- *66 E.M.A. Gross & W.P. Hogan Short Term Management of the Australian Exchange Rate, 1977-82, December 1982
- 67 V.B. Hall Industrial Sector Interfuel Substitution Following the First Major Oil Shock, January 1983
- 68 J. Yates Access to Housing Finance and Alternative Forms of Housing Loans in the 1980's, July 1983
- 69 V.B. Hall Major OECD Country Industrial Sector Interfuel Substitution Estimates: 1960-79, August 1983
- 70 F. Gill Inequality and Arbitration of Wages in Australia: An Historical Perspective, December 1983
- 71 W.J. Merrilees Do Wage Subsidies Stimulate Training? An Evaluation of the Craft Rebat Scheme, November 1983
- 72 M.C. Blad Economic Policy and Catastrophe Theory, November 1983
- 73 C.G.F. Simkin Does Money Matter in Singapore? April 1984
- 74 J. Yates Home Purchase Assistance for Low Income Earners, March 1984
- *75 C.G.F. Simkin Long-Term Aspects of New Zealand's External Deficits, April 1984
- 76 C.G.F. Simkin Methodological Scepticism, July 1984
- 77 V.B. Hall Industrial Sector Fuel Price Elasticities of Demand Following the First and Second Major Oil Shocks, August 1984
- 78 S.S. Joson Substitutability of 'Buy Local' Policy for Tariff Protection in Small Economies, January 1985
- 79 R.T. Ross Analysis of the 1980 Sydney Survey of Work Patterns of Married Women: Further Results, January 1985
- 80 J. Yates Discrimination in Lending, May 1985
- 81 R.T. Ross Measuring Underutilisation of Labour: Beyond Unemployment Statistics, May 1985
- 82 P.D. Groenewegen Alfred Marshall as Professor of Political Economy at Cambridge 1885-1900, June 1985
- 83 C.G.F. Simkin Popper's Methodology and Economic Theory, July 1985
- 84 E.M.A. Gross, W.P. Hogan & I.G. Sharpe Market Information and Potential Insolvency of Australian Financial Institutions, July 1985
- 85 F. Gill Over-Award Payments; Result of a Survey conducted in 1982
- 86 S.K. Kim Short Run Policy Analysis of Employment, Food Price and Rural-Urban Migration for a Labour-Abundant Developing Economy

Working Papers in Economics Published or Accepted for Publication Elsewhere

- 2 I.G. Sharpe & R.G. Walker Journal of Accounting Research, Vol. 13, No. 2, Autumn 1975
- 3 N.V. Lam Journal of the Developing Economies, Vol. 17, No. 1, March 1979
- 4 V.B. Hall & M.L. King New Zealand Economic Papers, Vol. 10, 1976
- 5 A.J. Phipps Economic Record, Vol. 53, No. 143, September 1977
- 6 N.V. Lam Journal of Development Studies, Vol. 14, No. 1, October 1977
- 7 I.G. Sharpe Australian Journal of Management, April 1976
- 9 W.P. Hogan Economic Papers, No. 55, The Economic Society of Australia and New Zealand
- 12 I.G. Sharpe & P.A. Volker Economics Letters, 2, (1979)
- 13 I.G. Sharpe & P.A. Volker Kredit and Kapital, Vol. 12, No. 1, 1979
- 14 W.P. Hogan Some Calculations in Stability and Inflation, A.R. Bergström et.al. (eds), John Wiley and Sons, 1978
- 15 F. Gill Australian Economic Papers, Vol. 19, No. 35, December 1980
- 18 I.G. Sharpe Journal of Banking and Finance, 4, 1980
- 21 R.L. Brown Australian Journal of Management, Vol. 3, No. 1, April 1978
- 23 I.G. Sharpe & P.A. Volker The Australian Monetary System in the 1970s, M. Porter (ed.), Supplement to the Economic Board 1978
- 24 V.B. Hall Economic Record, Vol. 56, No. 152, March 1980
- 25 I.G. Sharpe & P.A. Volker Australian Journal of Management, October 1979
- 27 W.P. Hogan Malayan Economic Review, Vol. 24, No. 1, April 1979
- 28 P. Saunders Australian Economic Papers, Vol. 19, No. 34, June 1980
- 29 W.P. Hogan, I.G. Sharpe & P.A. Volker Economics Letters, 6 (1980)
- 29 W.P. Hogan, I.G. Sharpe & P.A. Volker Economics Letters, 7 (1981)
- 30 W.P. Hogan Australian Economic Papers, Vol. 18, No. 33, December 1979
- 38 U.R. Kohli Australian Economic Papers, Vol. 21, No. 39, December 1982
- 39 G. Mills Journal of the Operational Research Society 33, (1982)
- 41 U.R. Kohli Canadian Journal of Economics, Vol. XV, No. 2, May 1982
- 42 W.J. Merrilees Applied Economics, Vol. 15, February 1983
- 43 P. Saunders Australian Economic Papers, Vol. 20, No. 37, December 1981
- 45 W.J. Merrilees Canadian Journal of Economics, Vol. XV, No. 3, August 1982
- 46 W.J. Merrilees Journal of Industrial Economics, Vol. XXXI, March 1983
- 49 U.R. Kohli Review of Economic Studies, Vol. L(1) No. 160, January 1983
- 50 P. Saunders Economic Record, Vol. 57, No. 159, December 1981
- 53 J. Yates AFSI, Commissioned Studies and Selected Papers, AGPS, IV 1982
- 54 J. Yates Economic Record, Vol. 58, No. 161, June 1982
- 55 G. Mills Seventh Australian Transport Research Forum-Papers, Hobart, 1982
- 56 V.B. Hall & P. Saunders Economic Record; Vol. 60, No. 168, March 1984
- 57 P. Saunders Economic Record, Vol. 59, No. 166, September 1983

- 58 F. Gill Economie Appliquée, Vol XXXVII - 1984 - No's 3-4, pp. 523-541
- 59 G. Mills & W. Coleman Journal of Transport Economics and Policy, Vol. XVI, No. 3, September 1982
- 60 J. Yates Economic Papers, Special Edition, April 1983
- 61 S.S. Joson Australian Economic Papers, Vol. 24, No. 44, June 1985
- 62 R.T. Ross Australian Quarterly, Vol. 56(3), Spring 1984
- 65 A.J. Phipps Australian Economic Papers, Vol. 22, No. 41, December 1983
- 67 V.B. Hall Economics Letters, 12, (1983)
- 71 W.J. Merrilees Australian Economic Papers, Vol. 23, No. 43, December 1984
- 74 J. Yates Australian Quarterly, Vol. 56(2), Winter 1984
- 81 R.T. Ross Australian Bulletin of Labour, Vol. 11(4), September 1985