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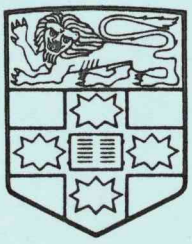
THE COSTS OF ADJUSTMENT AND THE INVISIBLE HAND WITH SPECIAL REFERENCE TO THE LABOUR MARKET*

by

Flora Gill

No. 58 February 1982.

DEPARTMENT OF ECONOMICS



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I Introduction

The costs of adjustment have already been incorporated into the analysis of a number of specific issues. These include determination of the level of investment by the business sector and analysis of the geographical and occupational mobility of members of the work force.[1] More recently the costs of adjustment have been declared to be a central issue in taxation policy (Sheshinsky and Weiss, 1977). However, it can still be argued that an analytical framework which postulates costless adjustment still pervades the thinking of many economists; this can be ascribed to the fact that the core of microeconomic theory still abstracts from adjustment costs.

Similarly, critics of the orthodox position on the properties of the price system pay little attention to adjustment costs. Instead, they focus on an alleged lack of substitutes in the physical sense.

In contrast, the present study maintains that, although the scope for substitution is in fact much larger than implied in the critiques of the orthodox position, a change in quantity demanded or supplied does not automatically follow every small change in price.

The possibility of having a discontinuity in price-quantity relationships has already been raised in the theoretical literature. Starret (1972) and Arrow and Hahn (1971) have taken issue with the picture of the ever-responding individual which has so long dominated the conventional theory. In their analysis, however, the discontinuity stems not from an assumption about the existence of adjustment costs, but rather from a rejection of the Hicksian postulate that the marginal rate of substitution between any two alternatives is a monotonic function of their relative quantities (other things remaining equal). In their analysis, the discontinuity occurs in the 'demand-function proper', where quantity rather than price is specified as the dependent variable.

On the other hand, when the analysis relaxes the assumption about the absence of adjustment costs, the discontinuity appears in the demand function, where price, rather than quantity, is the dependent variable.[2] While the price system is still capable of providing a unique solution when the

discontinuity occurs in the demand function proper, this is no longer the case when it occurs in the 'inverse-function'. Furthermore, even if the aggregate demand and supply functions are all continuous, they can no longer be defined in terms of the set of the initial endowments, the technological alternatives faced by firms, and the set of preferences entertained by households. This conclusion is not altered by incorporation of the set of adjustment costs into the analysis. The reason for this lies in the fact that once adjustment costs are incorporated into the model, the structural characteristics by themselves cannot define the functions, because the history of the agents' responses to previous price change becomes another determinant of the parameters of the aggregate functions.

In addition, relative price changes can lead to certain changes in quantity not predicted by the conventional model. Finally, contrary to the conventional expectation, the market mechanism cannot guarantee a unique price solution in all markets.

Turning to the labour market, economists who have analysed the demand for labour have long emphasised the costs incurred by firms whenever they avail themselves of substitute labour. On the supply side they have emphasised the costs involved in spatial and occupational mobility. The presence of such adjustment costs implies that the supply function faced by the individual firm, and the function which specifies its own demand for labour, are both discontinuous. To our knowledge, such demand and supply functions have not been analysed in terms of their mutual relationship.

Discontinuous individual demand and supply functions do not, of course, imply that the aggregate of the functions is discontinuous. However, continuity of aggregate market functions only guarantees that in the market as a whole quantity changes always follow price changes. A sufficient condition to guarantee continuity in the aggregate is that one agent changes quantity in the wake of any price change. However, if the demand and supply of labour in the individual firm are both discontinuous at the prevailing level of employment, the individual firm's wage may remain intact when the aggregate market wage rate changes. The reason for this is very simple. When both demand and supply functions are discontinuous[3] at the same level of employment, market forces do not provide a unique solution; instead, a whole range of wages is viable. The invisible hand can then provide only the boundaries defining the range of permissible wage rates, rather than a unique solution. When this is the case, it may be left to the parties concerned to seek a solution by bargaining.

Putting this in other words, the phenomenon of collective bargaining cannot be treated strictly as the result of an attempt to create monopoly power in a world where prices had hitherto been "parametrically-given". The inability of the market to guarantee a unique price solution makes the search for an alternative mode of price determination a matter of necessity.[4] Furthermore, in the absence of a unique price solution, agents on either side of the market are deprived of the protection provided in a world of "parametrically-given-prices"; within a range, the successful side can inflict a price rise on the opponent without incurring a quantity loss.[5] Thus, when adjustment costs are present, both sides are in a structural situation where both the need for protection and the temptation to be aggressive are simultaneously present, these being two aspects of the same phenomenon.

The reader may discern some common ground between the present paper and the recent economic literature on the implications of transaction costs.[6] A central argument in this literature has been that transaction costs render spot-auction-markets inferior to other modes of organization which economize on such costs (Mayers and Thaler, 1979). Similarly, the present paper maintains that in the labour market spot-auction-markets cannot be expected to occur as frequently as in some other markets, because of the significance of costs which are commonly abstracted from in pure economic analysis. In this paper, however, we are dealing with adjustment cost rather than transaction costs[7]; it points out that absence of spot-auction-markets may be related to their inability to generate a unique price solution when adjustment costs are significant.[8] We will show that in the labour market spot-auction-markets are unsatisfactory, because of their inability to guarantee a unique price solution when adjustment costs are significant.

The analytical framework developed in this paper is a generalized choice-theoretic model which explicitly incorporates costs of adjustment. Although applied here to the labour market, it provides a number of specific propositions which apply quite generally to choice in both the firm and the household.

II The Model

(a) The individual's decision problem.

The point of departure of the model which is developed in this paper is an explicit incorporation of adjustment costs into demand and supply analysis. No issue need be taken here with the orthodox assumption about the physical scope for substitution. The set of options available to an agent who is a 'newcomer'[9] to the system can therefore be adequately described by the conventional model of

household/firm choice. The choices made in this case will be clearly determined by the sets of relative prices, and marginally different prices are likely to result in different patterns of choice.[10]

However, once the economic agent is 'within the system' with a commitment made (in the form of specific human and non-human capital, or of a stock of household consumption assets), marginal differences in relative prices will not necessarily induce a change in the respective (demanded supplied) quantities.

Formally, the individual's decision problem can be described in the following manner:

$$\frac{\partial q_i}{\partial p_i} \begin{cases} > 0 \text{ if } \gamma > c \\ \\ = 0 \text{ otherwise} \end{cases}$$

where,

q = quantity index
p = price index
c = adjustment cost (sum of pecuniary and non-pecuniary components)
γ = an index of the incremental value of the objective function as a result of adjusting quantities in response to price change, ignoring the constraint imposed by the adjustment cost; i.e. γ denotes the gross benefit from quantity changes.

In words, benefits will have to exceed the costs of adjustment before the quantity will change in response to price changes.

Incorporating the costs of adjustment into an otherwise ordinary choice theoretic model, we obtain the following optimization problem:

Choose H so as to maximize

$$U = U[(Q_0 + H) - G(|H|)]$$

s.t.

$$P'H + P'Q_0 + L(|H|) \leq M \text{ where}$$
$$Q_0 \geq 0$$

$$H \geq -Q_0$$

U is a well behaved objective function
Q_0 is a vector of quantities of choice objects held prior to the change in price.
H is the vector of the changes in these quantitites following a price change
G specifies the non-pecuniary component of the ajdustment cost, while
L specifies the pecuniary components.
P is the price vector. Finally,
M is precuniary budget constraint.

Solving for H, the Kuhn-Tucker conditions imply that:[11]

$$\text{when } dp_i<0,\ h_i > 0 \text{ only if } \frac{\partial U}{\partial h_i} > \left(\lambda p_i + \frac{\partial G}{\partial |h_i|} + \frac{\lambda \partial L}{\partial |h_i|}\right)$$

$$\text{when } dp_i>0,\ h_i < 0 \text{ only if } \frac{\partial U}{\partial h_i} < \left(\lambda p_i - \frac{\partial G}{\partial |hi|} - \frac{\lambda \partial L}{\partial |h_i|}\right)$$

In other words, a decrease in the price of a good will be followed by an increase in its quantity only if the incremental benefit ($\partial U/\partial h_i$) exceeds the sum of the marginal benefits forgone as a result of the outlay on the good (λp_i), the outlay due to the pecuniary adjustment cost ($\lambda \partial L/\partial |h_i|$) and the 'psychic' loss ($\partial G/\partial |h_i|$).

When the price increases, a contraction of quantity will follow only if the sum of the loss of benefits as a result of reducing in quantity of object i ($\partial U/\partial h_i$), the psychic loss due to adjustment ($\partial G/\partial |h_i|$) and forgone benefits due to the pecuniary cost ($\partial L/\partial |h_i|$) falls below the benefits that would emanate from a shift to an alternative good (λp_i).

It, thus, follows that $\gamma = \partial U/\partial h_i - \lambda P_i$ in the case of a price decrease ($dp_i<0$) while $\gamma=\lambda p_i - \partial U/\partial h_i$ in the case of an increase in price ($dp_i > 0$). The assumptions of the orthodox model guarantees $h_i \neq 0$ for every single price change, however small. This is ensured by the monotonicity and continuity of the objective function in combination with the assumption about absence of adjustment costs; any price change automatically disturbs the equality between $\partial U/\partial h_i$ and λP_i, a necessary and sufficient condition for response. In the present analysis, such a disturbance, although a necessary condition, is not at all a sufficient one. The ensuing gap between $\partial U/\partial h_i$ and λP_i must be large enough to compensate for the adjustment cost before a response to price change will take place.

This, however, is not the end of the story. Ripples caused by the change of the price will by necessity show somewhere else in the system. Consider the case of an increase in the price of an item which does not lead to a change in quantity. Expenditure on this item inevitably increases. This increase can be financed by drawing on cash balances, in which case the latter serve as 'buffer-stock'. This role need not be confined to cash-balances. Indeed, losses can be minimized by reducing the quantity of items other than cash balances. The contraction of quantity will take place precisely where the sum of the loss of benefit and the associated adjustment cost is least. Similarly, a decline in price may leave the respective quantity intact, with an increase occurring somewhere else in the system where the incremental benefits (net of the adjustment costs) are greatest.

The conventional model of choice ranks the benefits of various choice objects in terms of their "income and substitution effects" in the case of the household's demand, or substitution and output effects, in the case of the firm's demand for inputs. The present analysis proposes that all choice items should be conceived as providers of buffer-stock services, over and above their direct role as objects of private consumption or productive inputs. Price changes which are not large enough to dwarf the costs of adjustment can result in changes of quantity in items which may appear rather remote in terms of substitution effects.

Furthermore, by necessity, they will occur in items whose relative price has in fact declined (as in the case where there is only one price change in an item which has relatively high adjustment costs). Their quantity will change simply because that will involve a smaller loss than would have occurred if there was a reduction in the quantity of the item whose own price had changed.

Turning to the labour market, this analysis proposes that certain segments of the labour force are likely to serve as a buffer-stock over and above their role as providers of productive service. In principle, it is possible to have a situation where an increase in the wage of skill group i will by itself generate a contraction in the employment by the firm of skill group j. The latter will be acting as a buffer-stock.[12]

(b) Aggregate market functions

The next step involves the specification of the aggregate function. Let γ and c vary over the population,[13] with distribution functions $g(\gamma)$ and $k(c)$. Denote by z the potential net change $(\gamma-c)\cdot(dh_i)$ in the value of the objective function following a price change and its distribution function by $h(z)$. If $h(z)$ is non-zero for any $z > 0$ (i.e. if there is at least one agent for whom the net return from responding to even an infinitesimal price change is non-negative) market demand function will be continuous in the neighbourhood of the prevailing price. However, the elasticity of aggregate response strongly depends on the proportion of the population for whom a response is advantageous. Denoting this proportion by $(1-\rho)$, ρ is given by

$$\rho = \int_{-\infty}^{0} h(z)\, dz$$

In other words, ρ is the proportion of the population which does not respond to the price change because the cost (c) exceeds the return (γ).

h(z) is dependent on the magnitude of the price change dp. Since γ increases monotonically with dp, $(1-\rho)$, the proportion of the population which overcomes the barrier of the adjustment cost c, grows monotonically with dp.

Using the neo-classical demand function-proper as a benckmark, q(p), the market demand function-proper defined in the present analysis can be described in the following manner:

$$q(p) = (1-\rho)\,[q(p)_N - \xi\,(c)\,]$$

Where ξ (c) denotes the effects of the adjustment costs as well as the effect of the non pecuniary costs.

D, the inverse of the demand function-proper, will be continuous only if ρ is always below 1, no matter how small the price change is. Graphically,

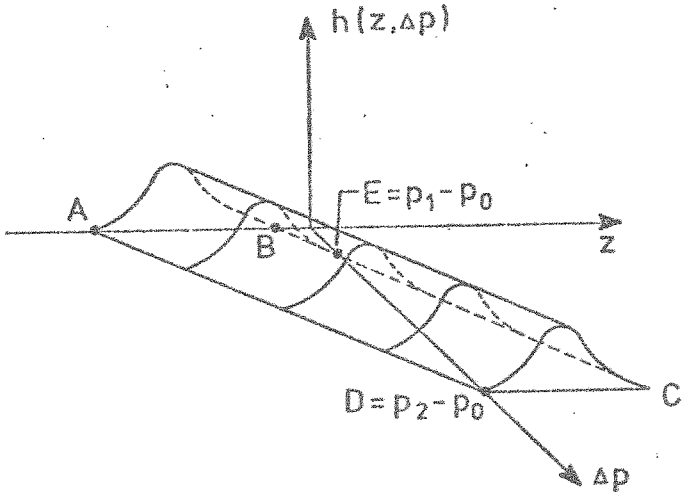

Figure I. The curves above are the plane sections of the h-surface in the Δp direction. The points p_0, p_1 and p_2 are cross-referenced in Figures I and II.

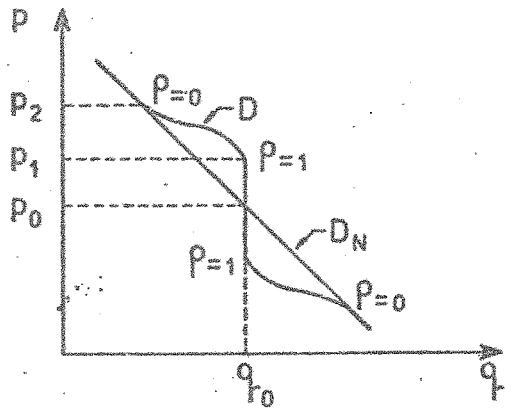

Figure II. Discontinuous aggregate demand functions (corresponding to h(z,Δp) in Figure I.)

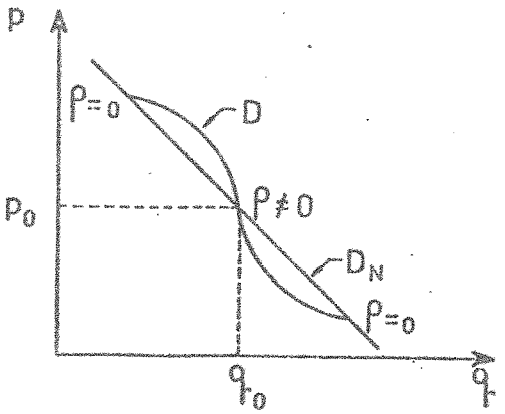

Figure III. Continuous aggregate demand functions when B>0 and A<0 in Figure I.

Three differences between D and the neoclassical function D_N are immediately obvious. First, D may display a discontinuity, while this can never happen in the latter. Secondly, the neoclassical demand will overestimate the response to a price change when the adjustment costs are significant.[14] Thirdly, D is not defined solely by the structural characteristics of the system (technology, preferences, adjustment costs and population). Unlike the orthodox case, D cannot be specified without a knowledge of the record of responses of the system to price changes in the past. History does matter. History matters, because the locus of the terminal points defined by D also depends on the 'backlog' of non-responses to past price changes.[15] Other things being equal, the larger this backlog is the larger the response.

Denoting this backlog by HB (historical backlog), we can now write $\frac{\partial Q}{\partial HB} > 0$. This implies that, given stationary technology, preferences and adjustment costs, there is a whole family of functions D in the neighbourhood of (P_0, Q_0), each associated with alternative levels of historical backlog.[16] Graphically,

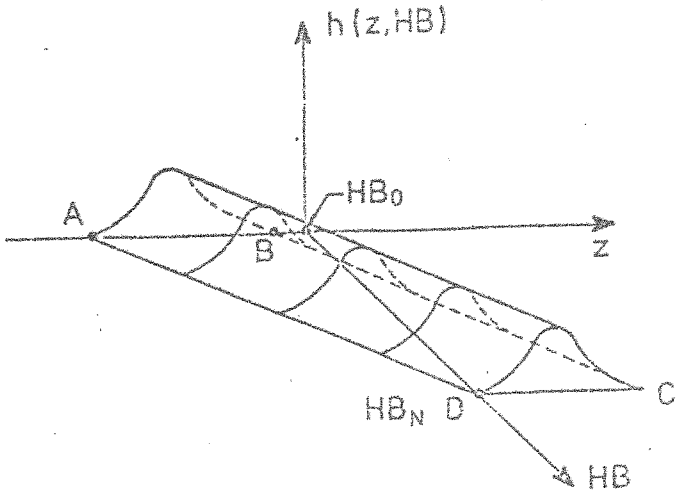

Figure IV. The curves above are the plane sections of the h-surface in the HB direction. HB_0 and HB_N are cross-referenced in Figure V.

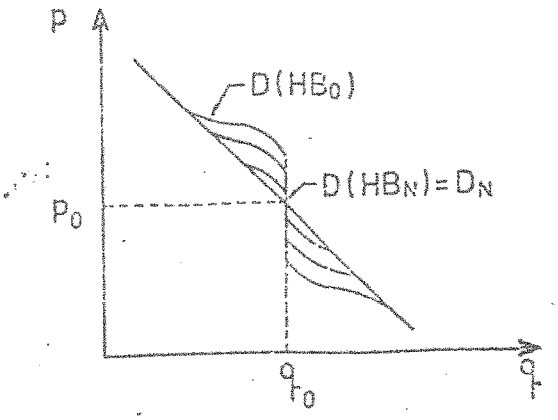

Figure V. A family of discontinuous aggregate demand functions, associated with different levels of HB. (B>0 and A<0 in Figure IV will result in a family of continuous functions)

In conclusion, a fundamental corollary of this analysis is that the price elasticity of aggregate demand cannot be adequately gauged by conjectures confined to income and substitution effect. Firstly, factors which determine the distribution of adjustment costs over a given population of economic agents can be at least as important.

Secondly, the distribution of the gross benefits resulting from the response to a price change is not simply determined by the distribution of preferences or production options open to agents (both being structural characteristics of the system), but it is also crucially dependent on the history of responses to price changes in the past. Consequently, the crucial determinants in answering the question as to how large will be the impact of a relative price change may depend very little on the physical attributes of the substitutes, but a great deal on a number of the factors which determine that proportion of the population (1-p) for which adjustment costs are not prohibitively high.

III Implications for the labour market

The above analysis focuses on discontinuity in the individual demand and supply functions; it is not the purpose here to arrive at a proposition about the universality of discontinuous aggregate demand and supply functions. The incidence of the latter may well be limited, and the time-honoured belief among members of the profession that aggregate functions are in general continuous may indeed have substance. The more significant point is that, by telling the story of aggregate functions in terms of a mythical average individual agent, the analysis misses an important determinant of market behaviour - the costs of adjustment.[17]

The main purpose of this analysis is to draw attention to the fact that continous aggregate market functions are made up of discontinuous individual functions of non-homogeneous agents. This in turn highlights aspects of the economic reality which are bound to have implications for the political and industrial behaviour of the parties in the labour market.

In the hypothetical (perfectly competitive) market meticulously spelled out in the Microeconomics textbooks, the perfect alternative employment is always available; and an employer who attempts to reduce real wages by a notch is immediately penalized by the invisible hand. The worker simply waves goodbye and crosses the road to a readily available new job where the total remuneration is precisely the same as in the job previously held.

However, once the intra-marginal units of the market supply curve do not represent the hours of work of the same worker who supplies the 'marginal' unit, this neoclassical account describes the case of only the 'marginal workers' in the 'marginal firm', at best. The myriad microcosms of those firms and workers analytically labelled as the 'intra-marginal units', are ignored.[18] These, however, include workers who

know that their wages must be reduced by more than an infinitisimal amount before they can respond by resigning, and firms who similarly know that labour cost can be significantly increased before a newly recruited worker or a different technology become a viable alternative.[19]

In other words, from the worker's point of view, once transfer costs have to be incurred before alternative options can be reached, the notion of freedom which is implicit in the perfectly competive model begins to erode. The higher the transfer costs involved the higher the sense of potential exploitation he is likely to experience. Similarly, buyers too may find themselves in a similar state of anxiety about being potential prey. They too are likely to be trapped in a situation where alternatives are not available within immediate reach.

Thus, we have a social arena where both parties suspect the possibility of a raid on their incomes. Unlike the conventional neo-classical account, here the external market forces do not impose their unique solution; they only provide a boundary to a range of wages, the unique solution of which has yet to be resolved. This is a situation of conflict which involves a battle over the rent.[20]

The conflict in this case is an endogenous economic phenomenon, an inevitable result of the fact that market forces (even if left alone) do not provide the unique solution promised by the conventional neo-classical account of the labour market.

Formally, we do not have unique equilibrium because D^L and S^L are discontinuous at the same value of L_o - there is no unique equilibrium because the demand and supply functions are discontinuous.[21] The demand conditions are given by:

$$L^d \begin{cases} = L_o \text{ if } w' < w < w'' \\ = D(w) \text{ otherwise,} \end{cases}$$

Similarly, supply conditions are given by:

$$L^s \begin{cases} = L_o \text{ if } \bar{w}' < w < \bar{w}'' \\ = S(w) \text{ otherwise,} \end{cases}$$

Instead of a unique equilibrium W_o, we obtain a set of equilibrium wage rates given by the range $g\{w_L, \ldots w_H\}$ where $w_L = w'$ and $w_H = \bar{w}''$.

One may ask how this conclusion is compatible with the constraints imposed by the product market. In other words, how can the price paid to labour go up without the firm facing a decrease in demand for its output in the wake of the consequent price increase. After all, each increase in the wage rate, ceteris paribus, shifts the supply schedule of a profit-maximizing firm to the left. The answer to this is that a wage increase is not necessarily followed by an increase in the price of the product even if one lives in the world of profit-maximizing firms. When transfer costs are present, or when the opportunity costs are below the rate of return earned by capital or labour for other reasons, the supply schedules of these two inputs are discontinuous. This in turn implies that wage increases could present a decrease in profit, and conversely an increase in the rate of profit can be achieved by a cut in the wage rate, while the product market remains intact. Within a range, changes in the earnings of labour and capital simply represent a redistribution of a given fund, the result of a battle over the rents.

In conclusion, an increase in the wage rate of a given skill group will not necessarily be followed by a change in its rate of employment, either because it could simply be met by a reduction in the profit margin of the firm with output levels and product prices remaining intact, or because the brunt of adjustment will be borne by other skill groups which involve low or nil adjustment costs. Thus the actual conflict may take any of the following three forms. It can take place either between capital and labour as a whole, or between the ranks of the workers themselves, if each group individually exploits its economic bargaining power, or it may run three ways spanning over its fullest potential range.

Obviously, once the existance of adjustment costs is explicitly incorporated into the analysis, one can no longer make meaningful statements about the relationship between changes in the average wage rate and the level of aggregate unemployment in the economy, even if productivity levels remain intact in every single firm. Changes in the average level of real wages may simply reflect a redistribution of rents from capital to labour, a possibility which has to be directly confronted.

IV. Summary and Conclusions

The purpose of this paper is to shed light upon a number of conclusions which are obtained by relaxing the assumption of zero adjustment cost and by rejecting a notion of the representative economic agent. While it does not at all intend to be an exhaustive critical analysis of the neo-classical modelling of an exchange economy the paper does call attention to what we believe to be a crucial flaw in the conventional approach. Since the aim is to take issue with conventional assumptions about the nature (absence) of constraints in the neo-classical model, adjustment costs are incorporated in an otherwise ordinary choice-theoretic model.

The analysis shows that when the costs of adjustment are explicitly recognised, individual demand functions are discontinuous. As a result the demand for goods (inputs) reflects not merely the role of goods as providers of direct services (as consumption or production objects), but also their role as providers of buffer-stock services. When the latter obtains, the demand for a certain set of goods (inputs) may decline when their relative price has declined rather than increased. This will happen when the change in their relative price is a result of a rise in the price of a 'high-adjustment-cost' substitute. The buffers will bear the brunt of adjustment within a range of relative price changes which are not large enough to warrant a change in quantity of an 'high-adjustment-cost' substitute.

A second departure from the conventional approach involves the rejection of the notion of the 'representative' economic agent. Instead, the specification of the aggregate demand function employs the notion of a heterogenous population of economic agents, each with his threshold level of price-change that will have to obtain before he responds by changing quantity in the opposite direction. This departure from the conventional model is intimately related to the incorporation of adjustment costs. Once the latter are present the aggregate demand/supply function cannot be continuous unless the population is heterogenous, (a necessary but not sufficient condition). The question of what determines the parameters of the distribution of the population over the threshold levels of relative price change then must be directly addressed. It is shown that a dynamic approach becomes indispensable.

Analysing the implications of the interaction between labour supply and demand functions which are both discontinuous at the prevailing level of (firm's/industry's) employment, it is shown that in such a case the market cannot provide a unique price solution. Bargaining is essential, and changes in wages (with unaltered productivity levels) do not always imply a change in either output prices or employment levels. Wage changes can simply be associated with changes in the level of profit, reflecting a redistribution of economic rents between capital and labour.

FOOTNOTES

* I wish to thank Ulrich Kohli, Dilip Madan and Tony Phipps for their useful comments on an early draft of this paper.

1. R. Eisner and R. Stortz paper (1963) has to be considered the pioneering work in the investment literature. See Mussa (1977) for a detailed historical account of the place of adjustment cost in investment analysis. In the field of labor mobility L. Sjaastad's paper (1962) has to be regarded as the path-breaker. More recently, an analysis of internal migration in the United States has been published Gill (1979) incorporating the cost of adjustment.

2. Adhering to convention, this paper employs the term "demand function" to denote a relationship in which the price is the dependent variable. Hence, demand function is synonymous with the "inverse demand function" of the mathematical economics literature.

3. Discontinuity implies a gap between existing rates of pay and the opportunity cost. This can occur either because of an absence of an equivalent alternative or because the alternative cannot be attained without incurring a cost.

4. There is a similarity between our conclusions and W. Fellner's (1947) in that wages are indeterminant at a given level of employment. However, the underlying causes are markedly different; adjustment costs do not play any role in Fellner's model. Hicks' model (1932), on the other hand, postulates a monotonic relationship between wages and employment, while the model specified in O. Ashenfelter's and G.E. Johnson's (1969) seminar study does not explicitly treat employment levels.

5. In the same vein, B. Klein, R. Crawford and A. Alchian (1978, p.299) say' "One of the fundamental premises of this paper is that monopoly power, better labelled 'market power' is pervasive. Because of transactions and mobility costs,'market power' will exist in many situations not commonly called monopoly."

6. See for instance D. Mayers and R. Thaler (1979), B. Klein, R. Crawford and A. Alchian (1978), Williamson (1975, 1979) and O. Williamson, M. Wachter and J. Harris (1975). The pioneering work of Oliver Williamson is universally recognised by these authors.

7. In the present paper attention is focused on adjustment costs which are incurred in the process of quantity changes. This is to be distinguished from recent discussion of adjustment costs by the individual seller in the process of a price change such as those discussed in E. Sheskinsky and Y. Weiss' paper (1977). The literature on transaction costs focuses on yet another type of cost which can be described as the 'payment' required to procure the services of the 'auctioneer', (i.e., the costs of information gathering and signalling).

8. Mayer and Thalers' paper employs a 'transactional approach' proposition an alternative foundation for the 'implicit-contract' phenomenon (accepting the latter as the explanation for 'sticky wages'). The present paper in contrast, concludes that bargaining is often needed when adjustment costs are paramount. However, bargaining involves negotiation costs which, in turn, would contribute to 'stickyness' of wages. In any event, the purpose of this paper is to point out a number of important effects of (quantity) adjustment costs. The intention is not to provide an alternative to the transactional approach, both adjustment and transaction cost must be emphasized.

10. Namely, a person who has not held a job, or has not yet acquired any specific skill in any other way - an owner of a substantial stock of very liquid assets or a person with access to finance without any special attachment to any specific enterprise - or household which has not yet acquired any stock of household durables.

10. In the case of 'newcomer' to the system there is little analytical gain in singling out adjustment costs. These costs can be incorporated into relative prices, the latter being defined as gross of adjustment costs. The gist of present paper is that this would not be the case when "movements within the system" are being contemplated.

11. The solution to the optimization problem involves the definition of two non-negative variables

$$h_i^+ \text{ and } h_i^- \text{ where } h_i^+ = \begin{cases} h_i \text{ if } h_i > 0 \\ 0 \text{ otherwise} \end{cases}$$

and $h_i^- \begin{cases} -h_i \text{ if } h_i < 0 \\ 0 \text{ otherwise} \end{cases}$ The optimization problem is then rewritten as

$$\max.\ U\ (Q_0 + H^+ - H^-) - G\ (H^+ + H^-)$$

$$\text{s.t. } P'Q_0 + P'H^+ - P'H^- + L\ (H^+ + H^-) \leqslant M$$

$$-H^+ + H^- \leqslant Q_0$$

$$H^+,\ H^- > 0$$

Note that at an optimum only one of h_i^+, h_i^- will be positive. A debt of gratitide is owed to Dilip Madan for suggesting to me this solution to the optimization problem.

12. The ranks of j are most likely to be occupied by unskilled workers. Walter Oi's (1962)well known 'quasi-fixity' hypothesis (which treats skilled workers as a quasi-fixed input) draws the same conclusion.

13. γ and/or c must vary over the population, otherwise the market demand function is strictly discontinuous at the point of any prevailing market price.

14. There is no objection here to making the adjustment costs a function of time with a negative derivative between the two (although exceptions to this rule will not be lacking). However, the position taken by this paper strongly objects to embracing the assumption that in the real world adjustment costs converge to zero within practically admissable time horizons.

15. Conceptually, ignoring the effect of the pecuniary and non-pecuniary costs on the budget constraint, and on the rates of substitution which are defined by the objective function, this backlog can be approximated by the gap between the actual Q_t the agent chose and the Q that would have obtained in a world of zero adjustment costs.

16. Economic historians, analysing specific case studies, have emphasized the importance of these determinants of choice. For example, Gerschenkron (1962) pointed out the importance of the magnitude of such a backlog-variable in explaining the difference between technologies employed by various countries.

17. Additional methodological implications of representing market functions in terms of the 'average economic agents' are dealt with by the present author in Gill, (1981).

18. As R. Raimon (1953) observed almost 30 years ago:"Production workers, however, who constitute the bulk of the factory labor force, have difficulty penetrating a new plant (at their present occupational rank) because of the usual rule that present employees get first chance at all vacancies. If they do get in, they are likely to get undesirable jobs which present employees do not want." (p. 183). This rule, Raimon observed, is related to the fact that these production workers possess significant skills which, however, are specific to the firm. Once outside of the firm their skills are fairly indistinguishable for those of the unskilled.

19. Technically speaking, once adjustment costs are introduced into an otherwise ordinary choice theoretic model, economic-rents become a pervasive component of earned income. These are not Marshal's 'quasi' rents', which are recognized only to be dismissed as short term transient phenomenon. Here rents arise not simply because time must elapse before transfer takes place, but primarily because the shift from one neo-classical optimum to another often involves significant resource (and/or pecuniary psychic) cost. This also is the point made by Gould (1968). in his critique of investment models which are derived from the comparison of two optima points. He points out that they disregard the cost which has to be incurred in the process of moving from one optimum to another, as well as the fact that the presence of the costs ipso-facto intervenes in the determination of the position of the new optimum.

20. More precisely, one should speak of "quasi-rent". This discussion is very close in spirit to Klein, Crawford and Alchians' analysis of appropriable quasi-rents' (1978).

21. Both D(W) and S(W) are discontinuous in the neighbourhood of L_0 because of the catch-up effect which takes place when the backlog is large enough to overcome the barriers posed by the costs of adjustment, i.e., pedantically speaking, costs of adjustment lead to a discontinuity in the demand function proper as well as in its inverse.

REFERENCES

Ashenfelter, Orley and G.E. Johnson, (1969), "Bargaining Theory, Trade Unions and Industrial Strike Activity" American Economic Review 59.

Arrow, Kenneth J. and Frank Hahn (1971), General Competitive Analysis, (San Francisco: Holden-Day).

Arrow, Kenneth J. (1974), "The Theory of Discrimination", in O. Ashenfelter, and A. Rees, (eds), Discrimination in Labour Markets, (Princeton, N.J.: Princeton University Press).

Eisner, R. and R. Strotz, (1963), "Determinants of Business Investment" in Impacts of Monetary Policy (Engelwoods Cliffs, N.J., Prentice Hall).

Fellner, William (1974), "Prices and Wages Under Bilateral Monopoly", Quarterly Journal of Economics.

Gerschenkron, Alexander (1962), Economic Backwardness in Historical Perspective, (New York, Frederick A. Praeger Publishers).

Gill, Flora (1979), Economics and the Black Exodus: An Analysis of Negro Migration Emigration from the Southern U.S.: 1910-1970, (New York, Garland).

Gill, Flora (1981), "Some Methodological Implications of the Marginal Revolution", Australian Economic Papers, 20.

Gould, J.P. (1968), "Adjustment Costs in the Theory of Investment of the Firm", Review of Economic Studies, 35.

Hicks, J.R. (1932), The Theory of Wages (London, MacMillan).

Klein, Benjamin (1978), Robert G. Crawford, and Armen Alchian, "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process" in The Journal of Law and Economics 21.

Mayers, David and Richard Thaler, (1979), "Sticky Wages and Implicit Contracts: A Transactional Approach" Economic Inquiry, 16.

Mussa, Michael (1977), "External and Internal Adjustment Costs and the Theory of Aggregate and Firm Investment", Economica 44.

Oi, Walter Y. (1962), "Labour as a Quasi-Fixed Factor", Journal of Political Economy, 70.

Raimon, Robert L.(1953), "The Indeterminantness of Semiskilled Workers" Industrial and Labor Relations Review, 6.

Sheshinsky, Eytan and Yoram Weiss (1977), "Inflation Costs of Price Adjustment" Review of Economic Studies, 44.

Sjaastad, L.A. (1962), "The Costs and Returns to Human Migration", The Journal of Political Economy, 53, Supplement.

Starret, D. (1972), "Fundamental Non-convexities in the Theory of Externalities", Journal of Economic Theory, 4.

Williamson, Oliver E. (1975), Markets and Hierarchies: Analysis and Antitrust Implications (New York, The Free Press).

Williamson, Oliver, E., Michael L. Wachter, and Jeffry E. Harris, (1975), "Understanding the Employment Relations" in Bell Journal of Economics, Spring.

Williamson, Oliver (1979), "Transaction-Cost Economics: The Governance of Contractual Relations" The Journal of Law and Economics, 22.

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