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**TRADE UNIONS: SOME ECONOMIC ASPECTS OF THEIR BEHAVIOUR  
WITH PARTICULAR REFERENCE TO THE REPUBLIC OF IRELAND**

by

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TRADE UNIONS: SOME ECONOMIC ASPECTS OF THEIR BEHAVIOUR  
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David Sapsford\*\*

Chapter 1

INTRODUCTION AND OBJECTIVES

General Approach

In outlining the objectives of the Economic and Social Research Institute's various publications series, Kennedy described the Broadsheet Series as being designed inter-alia, to offer an outlet for 'pilot or feasibility studies in new areas that have not been researched before . . . , broadly based evaluations of other findings as well as those of the author himself, . . . (or via) reasoned argument to clarify underlying value premises or to generate interesting hypotheses' (1979, p.vii).

The current paper sets out to follow these objectives in the context of the economic analysis of trade unions, with special reference to the Republic of Ireland. Trade unions are complex institutions which can be analysed from a variety of different disciplinary vantage points; economic, sociological, political and behavioural. However, it is important to recognise at the outset that this paper confines itself exclusively to the economic analysis of trade unions, venturing into the other possible disciplinary territories only briefly and very occasionally.

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Although it might be argued (see Johnson, 1975) that the study of trade unions in general, has been somewhat neglected by the economics profession over recent years, there has been a particular dearth of research into the economics of Irish trade unions,<sup>1</sup> with the consequence that many hypotheses and models which are well established in the context of other countries have yet to be put under scrutiny in the context of the Irish economy. Accordingly two of the main objectives of this paper fall squarely into the court of the Broadsheet Series, in that it seeks to provide some coverage of an area of the Irish economy which has been little researched before, plus some evaluation of existing findings and knowledge relevant to the Irish case. In addition, the paper seeks to make some contribution in a particular hitherto under-researched area, namely the econometrics of Irish union growth. Finally, we also make a number of suggestions for possible future research in this area which may eventually provide some answers to many, as yet, unasked questions.

### Outline

Economists have analysed trade unions from a variety of angles and in order to put the current state of the art into perspective, this paper begins with a chapter giving a brief summary and overview of the large and growing literature in the area. As will quickly become apparent, the economic analysis of trade unions in Ireland is very much an under-researched terrain, but one area in which it is possible to make some contribution, given existing data sources, concerns the determinants of the rate of union growth in Ireland. Accordingly, the following chapter presents a detailed analysis of union growth in Ireland over the post-war period, using as its focal point a model whose performance has proved reasonably satisfactory in the analysis of the experiences since about 1900 of a range of other countries.

In the final chapter a variety of suggestions is made regarding future possible research directions.<sup>2</sup>

## Chapter 2

THE ECONOMIC ANALYSIS OF TRADE UNIONS: A BRIEF  
OVERVIEW OF THE LITERATURE

Early Thinking

In the classical system and its direct descendants the new classical and monetarist schools of thought, trade unions are, in essence, regarded as merely another market imperfection, to be thought of in much the same sort of way as such other restrictions to trade and impediments as the existence of monopoly in product markets and factor immobilities. Like other market imperfections, trade unions are seen as hindering (or, at the very least, slowing down) the operation of free market forces and thereby giving rise to various distortions from the competitive equilibrium which in turn give rise to adverse allocative and welfare consequences. This type of view is clearly illustrated in the writings of such economists as Friedman (see, for example, Friedman, 1951 and the subsequent comments by Ulman, 1955)<sup>1</sup> or more recently in the writings of such as Hayek (1980) and Minford (1982, 1983). See also the various papers contained in the Institute of Economic Affairs (1978).

The policy prescription which follows from this view of unions is simply that governmental policies should be directed toward curbing the activities of unions in order to restore the economic system to its former competitive state. However, this view ignores two, possibly important, considerations: first, that in the absence of unions the economy would not in any case be perfectly competitive because, amongst other factors, there is often a considerable degree of monopsony on the demand side of the labour market. In fact, it is analytically quite straightforward to demonstrate the possibility that, in situations characterised by the presence of some degree of monopsony amongst labour purchasers, the activities of a trade union which establishes a union minimum

wage can actually result in levels of employment and wages which are both closer to the perfectly competitive equilibrium values than would have been the case if there was no union (for a derivation of this result see Sapsford 1981, pp. 89-90). Secondly, this view ignores the possibility that trade unions might, despite potential negative effects through overmanning or 'feather bedding' (Weinstein, 1964), in practice result in a net increase in the productivities of their members. There is an extensive literature here surrounding the notion of the so called 'exit-voice' trade off which provides some evidence to suggest that, in practice, unions may result in a net increase in the productivities of their members.<sup>2</sup>

### Some Theoretical Issues

One of the most durable problems in the area of labour economics has been the search for an adequate theory of the trade union. In the late 1940s and early 1950s the whole question of whether it is valid to analyse trade unions as economic, as opposed to political, entities was given an extensive airing in what has since become known as the Ross-Dunlop debate. The antagonists in this debate divided into two camps; on the one hand, the economists' camp argued that in the same way that firms and consumers can be analysed as rational maximising units, so too can trade unions, with the only problem being to establish precisely what it is that unions actually seek to maximise. Perhaps the clearest pronouncement of this view is due to Dunlop who argued that 'an economic theory of a trade union requires that the organisation be assumed to maximise (or minimise) something' (1944, p.4). On the other hand there is the 'political' view, attributed principally to Ross (1948) which argued, in essence, that trade unions are institutions composed of a heterogenous membership, with heterogeneous interests and goals and as such, unions are much too complex to be meaningfully analysed within the economists' standard maximising framework. Ross

(1948) and his followers went on to argue that what is needed instead is a political approach which sees the behaviour of unions as being the result of a process in which trade union leaders and decision makers, given their own objectives (including the survival of the union as an organisation) reconcile a variety of political pressures generated both within the union and by forces external to it.

Although the controversy between these two schools continued on a lively basis over a number of years, an impartial observer might reasonably conclude that neither a clear victor nor a satisfactory resolution appeared, instead both parties chose to depart along their separate analytical paths.<sup>3</sup> However, a recent contribution by Mitchell (1972) explicitly recognised the uncertainties inherent in collective bargaining situations and offered an interesting resolution of the debate by introducing into the analysis the notion of employer resistance to union claims.

As noted in the Introduction, this paper considers only the economics of trade unions. While there may be an element of truth in Ross's claim that the policy making process internal to the union can only be fully understood within a wider framework than that offered by the economists' traditional approach, the view adopted throughout this paper is that an economic approach can throw some valuable light on the workings of trade unions, not least of all because the objectives they do actually seek to achieve (however arrived at) are invariably expressed in terms of such economic magnitudes as improvements in wages, changes in employment and manning levels and changes in other employment conditions, and as such are readily amenable to the economists' mode of analysis.

#### The Search for an Economic Theory of the Union

Over the years, much intellectual energy has been expended in the search for what might, in some sense, be considered an adequate theory of the union. Following

the pronouncement of Dunlop cited above, many, if not most, economists see unions as being economic agents, analagous in a number of respects to firms and consumers, and argue that in the same way that a rational firm (consumer) seeks to maximise profits (utility), so too a rational union must analagously possess some single, clearly definable, maximand. Numerous suggestions have been put forward as to the precise nature of this maximand and a number of these are usefully surveyed by Cartter (1959, pp.77-94), Rees (1962, pp.52-64) and Sapsford (1981, pp.90-101).

While a number of early writers saw unions as simply seeking to maximise either their members' wages or employment levels, these approaches ultimately floundered because of the constraint or trade-off imposed by the presence of a downward sloping demand function for union labour. In the wage maximising case, we obtain the implausible prediction that unions have no regard for the employment of their membership (and in the final analysis that the union leadership has no regard for the union's survival as an institution), while in the employment maximising case we obtain the equally implausible prediction that union leaders are willing to trade-off their members' and their own wages (perhaps to the extent that they are no higher than would be the case in the absence of the union) in the cause of increasing the numbers of members employed. Although proponents of these two simple models were able to put forward particular historical instances as evidence in support of their hypotheses, it seems clear in light of the above considerations that neither view offers a satisfactory general model of union behaviour.

Faced with this dilemma, a number of analysts have put forward the wage bill, almost by default, as a likely union maximand, primarily on the grounds that it embraces both wage and employment dimensions. However, this model falls down not only because of the often unrealistic prediction that unions, when confronted with an elastic demand for their labour, will seek wage cuts but also because it suffers, in effect, from the



same deficiencies as both the wage and employment maximising cases considered above (Sapsford, 1981, p.93).

In yet a further attempt to find a clear-cut union maximand, the so called union-monopoly analogy was proposed. This view sees unions as being analagous to product market monopolists and according to this model, the union, confronted with a downward sloping demand curve for its members' labour services, will seek to expand employment up to the point where the curve marginal to its labour demand schedule is intersected by its members' labour supply function (where the latter is seen as being analagous to the monopolist's marginal cost curve). Consequently, according to this model, the wage-employment combination which the union seeks to achieve is that at which the 'marginal demand' for its members' labour (Marshall et al., 1976, p.330) is equal to their supply prices. This model, however, falls down on a number of grounds but principally because the union possesses nothing analagous to the marginal cost function of the monopolistic firm, with the consequence that the maximand implied by analysis (namely, the economic rent equal to the surplus of the memberships total wage income over and above their transfer earnings) is a magnitude unlikely to establish itself as being of particular concern to the union (Reder, 1952), especially when one recognises that the wage gains and employment losses arising from the pursuit of such a policy accrue to different individuals (Rees, 1973, pp. 128-9).

#### Utility Maximising Approaches

In more recent writings, the majority of economists seem to be willing to accept the view that unions are concerned, inter alia, with both the wages and employment of their members but to leave the precise weights attached to these two variables as a matter for analysis. More specifically, it is now common to write for the union, a utility function which specifies union utility to be an increasing function of both the wages

and the employment of their members. This type of model can be found, for example, in the writings of Fellner (1951), Cartter (1959), Mulvey (1978), Wilkinson and Burkitt (1973), inter alia, and Oswald (1982) has recently derived the sufficient conditions for a trade union to possess a 'well-behaved' utility function in the wage-employment space. The concept of a well-behaved union utility function is exactly analagous to the well-behaved production function concept of production theory (see Allen, 1968, p. 44) and can be written as follows:

$$u = u(w, e); \quad \frac{\partial u}{\partial w} \geq 0, \quad \frac{\partial u}{\partial e} \geq 0, \quad \frac{\partial^2 u}{\partial w^2} \leq 0, \quad \frac{\partial^2 u}{\partial e^2} \leq 0 \quad (2.1)$$

where  $u$  denotes the level of union utility and  $w$  and  $e$  denote, respectively, the wage rate and employment level. Notice also that it is usual to specify wages and employment as being the only arguments of the union utility function either on ceteris paribus grounds or on the grounds that, for analytical purposes, all non-wage and non-employment dimensions can be expressed in wage equivalent terms.

Perhaps the first major contribution in this area can be found in Cartter's (1959) extension of the earlier analysis of Fellner (1951).<sup>5</sup> Cartter specifies union utility as being an increasing function of both wages and employment and argues that the significance attached by unions to the status quo will give rise to union indifference curves which will be sharply kinked about the prevailing wage-employment combination, indicating a high degree of complementarity between wages and employment. Treating the labour demand function as a constraint, Cartter derives the unions' optimum wage-employment combination in the usual way as the tangency point between the labour demand and indifference curves. Having established this solution Cartter then proceeds to investigate some elementary dynamics and derives the union's 'wage preference path', which is simply the locus of utility maximising equilibria which is generated by changes

in the conditions of labour demand. (For further discussion see Sapsford 1981, pp.99-101). Cartter argues that this path will, in all probability, also be sharply kinked about the prevailing wage-employment combination, reflecting not only the commonly observed downward stickiness of money wages during downturns but also a tendency for unions to prefer to take the benefits arising from improvements in the conditions of labour demand in the form of wage rather than employment increases.

In a recent study, Dertouzos and Pencavel (1981) seek to explicitly test the above utility maximising approach. Utilising a utility function of the Stone-Geary form, as set out in (2.2) below, they show that within this form of utility function are nested a number of the particular forms discussed above. The Stone-Geary union utility function defined over real wages ( $w$ ) and employment ( $e$ ) is specified as follows:

$$u = u(w, e) = (w - \gamma)^\theta (e - \delta)^{1 - \theta} \quad (2.2)$$

where  $\gamma$  and  $\delta$  represent, in the usual way, 'reference', 'minimum' or 'necessary' values. The function is homothetic to the point  $(\gamma, \delta)$  and the bracketed terms  $(w - \gamma)$  and  $(e - \delta)$  represent supernumerary real wages and employment respectively. The value of  $\theta$  shows the relative importance attached by the union to supernumerary wages versus supernumerary employment and in the particular case where  $\gamma = \delta = 0$ ,  $\theta$  can be interpreted as a measure of the relative weights attached by the union to wages and employment.

The nesting within (2.2) of a number of the alternative suggested hypotheses regarding union objectives is easily seen. For example, in a closed shop situation, the case where  $\theta = 0.5$  and  $\gamma = \delta = 0$  reduces to the wage bill maximisation case already discussed, while the case where  $\theta = 0.5$ ,  $\delta = 0$  and  $\gamma$  equals the competitive wage reduces to the rent maximisation hypotheses of union behaviour of the sort proposed by both Rosen (1970) and de Menil (1971).

The great advantage of this approach is the possibilities which it offers for explicitly discriminating, on empirical grounds, between a number of alternative hypotheses regarding union objectives which have been widely discussed in the previous literature. Dertouzos and Pencavel construct a model in which (2.2) is maximised, in the usual way, subject to the trade-off constraint offered by the employer's labour demand function and testing this model against micro data relating to the activities of the International Typographical Union in various US localities between 1946 and 1965, they find evidence of parameter values which seem to support the more general formulation (2.2) rather than the particular cases represented by either the wage bill or rent maximisation hypotheses. It would certainly be a worthwhile exercise to apply this method to data relating to the activities of a particular Irish union (or unions), or possibly even to the activities of the Irish Congress of Trade Unions as representing, in National Wage Agreements, a coalition of member unions.

#### Unions and Relative Wages

One question which has attracted particular research interest over a number of years is the extent to which unions influence the wages of their members relative to those of comparable non-union members. Ideally, one would like knowledge of the wage which members would have earned in a world characterised by the total absence of trade unions, which could then be compared with the wages they actually earn in the presence of unions. In practice, such data are clearly unobservable so investigators are typically led to compare wages of union members with those of non-union members who are as alike as possible.

Notice, however, that the wages actually paid to non-union members deviate from those payable in the total absence of unions because of a variety of forms of 'spillover-effects.' There are three such spillover-effects discussed in the literature.

First, the threat effect (Rosen, 1969) according to which non-union wages are pulled upwards as non-union employers pay wages something closer or equal to the union wage in order to minimise the probability of their workers becoming unionised.

Secondly, there is the displacement effect, according to which non-union wages are depressed as union labour displaced from employment in the union sector as a consequence of the higher wages paid therein, increases the supply of labour to the non-union sector thereby (with unchanged labour demand conditions) reducing the non-union wage (Rees, 1963). Finally, there is the less widely discussed effect referred to as the morale effect (Oswald, 1981). According to this hypothesis, non-union workers perceive their adverse differentials with respect to their unionised counterparts and suffer a deterioration in their morale which manifests itself in a decrease in their marginal physical product at any given employment level. This shift in turn gives rise to a leftward shift in the non-union labour demand/marginal revenue product curve which results, ceteris paribus, in a decrease in the non-union wage.

### Analytical Issues

The analytical framework within which empirical studies of the magnitude of trade union relative wage effects are conducted was laid down by Lewis (1963), who specified the observed average wage in industry or occupation  $i$  ( $w_i$ ) as a geometric weighted average of the wage rates prevailing in the union and non-union sectors of  $i$  ( $w_i^u$  and  $w_i^n$  respectively) with weights given by  $u_i$  and  $(1 - u_i)$ , where  $u_i$  indicates the proportion of the labour force in  $i$  which is unionised. Although this approach is frequently used in the analysis of cross-section data by occupational or industrial groups, it is often alternatively used in the analysis of data samples relating to individual workers, in which case the subscript  $i$  refers to the  $i$ th individual and  $u_i$  becomes a binary variable, taking the value of unity if the  $i$ th worker is a union member and zero otherwise.

Thus we can write:

$$\ln w_i = u_i \ln w_i^u + (1 - u_i) \ln w_i^n \quad (2.3)$$

from which we obtain:

$$\ln w_i = \ln w_i^n + u_i \ln(1 + r_i) \quad (2.4)$$

where  $r_i = \frac{w_i^u - w_i^n}{w_i^n}$  denotes the (proportionate) union/non-union differential.

Equations (2.3) and (2.4) are identities which must hold by construction, but notice that although data relating to both  $w_i$  and  $u_i$  are generally available  $w_i^n$  and  $w_i^u$  are not generally observable. The typical research strategy adopted in empirical studies of the relative wage effect of unions is therefore to specify a model of the factors determining the non-union wage. The theory of wage differentials (Sapsford, 1981, pp. 187-213) suggests a variety of independent variables which determine the structure of wages between different occupations, industries and individuals and investigators typically use relevant hypotheses from this theory to model the wage that would prevail in the total absence of unions as a function of some appropriately specified adjustment vector.

Letting  $X_i$  denote an adjustment vector of the observable variables which are hypothesised as determining the non-union wage, we can write:

$$\ln w_i^n = f(X_i) + e_i'$$

and assuming that

$$\ln(1 + r_i) = \ln(1 + r) + e_i''$$

where  $r$  denotes the mean union/non-union differential and where  $e_i'$  and  $e_i''$  are disturbance terms, (2.4) can be written as

$$\ln w_i = f(X_i) + \beta u_i + e_i \quad (2.5)$$

where  $e_i = e_i' + e_i''$  and  $\beta = \ln(1 + r)$

Given observations on  $w_i$ ,  $u_i$  and the components of  $X_i$ , estimates of the magnitude of  $r$  (denoted by  $r$ ) can now be obtained by applying the usual methods of econometric analysis to equation (2.5). Denoting the regression estimate of  $\beta$  by  $\hat{\beta}$ , we see that the estimated union/non-union differential is obtained as  $r = \exp(\hat{\beta}) - 1$ .

As far as the adjustment vector  $X_i$  is concerned, the precise specifications of its constituent independent variables varies from study to study and according to whether the sample being analysed refers to industry, occupational or individual data. However, such vectors have typically been specified to include such variables as measures of skill mix, measures of industrial concentration, age and sex mix variables, educational variables and the like. A useful tabular survey of the explanatory variables employed in recent UK studies can be found in Metcalf (1977, p. 160).

It is, however, important to recognise that having specified the variables hypothesised as determining the wage that would prevail in the total absence of unions it is then necessary to augment the analysis to take account of the various spillover effects discussed above. Different writers have approached this problem in different ways. For example both Metcalf (1977, p. 173) and Nickell (1977, p. 195), in their studies of British data, augment the adjustment vector  $X_i$  by specifying the discrepancy

between actual non-union wages,  $w_i^n$ , and those that would prevail in the complete absence of unions as depending solely on the extent of unionism in the occupation or industry in question. An alternative treatment of this discrepancy was adopted in an earlier study of the UK data by Pencavel (1974, pp. 195-6) who simply treated the difference between  $w_i^n$  and the wage payable in the complete absence of unions as a component of the variations in the disturbance term of his regression equation.

Notice that in the UK context, data relating to union coverage (i.e., the number of workers, both union members and non-union members, covered by collective agreements under which they are paid the union rate) as distinct from union membership, have become available from the Department of Employment's New Earnings Surveys of 1973 onwards. Consequently, most recent UK empirical studies have used union coverage in preference to membership data, since these go some way towards capturing spillover effects in that they measure directly the proportion of workers in  $i$  (both members and non-members) in receipt of the union wage (e.g., Mulvey, 1976; Metcalf, 1977; Nickell, 1977; and see also Layard, Metcalf and Nickell, 1978).

### Econometric Issues

A number of interesting econometric issues arise in the context of this sort of analysis and these have been widely discussed elsewhere in the literature (e.g., Lewis, 1963; Parsley, 1980). In particular, Creedy (1979) has recently questioned the usual specification of the dependent variable  $\ln w_i$  in equation (2.5) as the logarithm of the arithmetic mean wage in industry or occupation  $i$ , pointing out that this is not equivalent to the arithmetic mean of the log of wages as specified in identity (2.3). Notice, however, that some recent evidence presented in a study of UK data (Treble and McGrady, 1983) suggests that the effect of this mis-specification of the dependent variable upon the estimated size of the union/non-union differential is, given the shape of the wage distribution, likely to be negligible.



In addition, a number of writers have argued that simultaneous rather than single equation estimating techniques are appropriate since union wage levels and membership are jointly determined (Reder, 1965; Johnson, 1975). Particularly interesting issues arise in the analysis of disaggregated, especially individual, data and in this connection a number of writers have developed special variants of logit analysis to handle such situations (see, in particular, Schmidt and Strauss, 1976; Schmidt, 1978; Lee, 1978; Olsen, 1978).

### The Evidence

On the basis of a detailed survey of previous work, Lewis (1963) concluded that US unions had probably raised the average wage of their members to somewhere between 10 and 15 per cent above that of their non-unionised counterparts and this conclusion has generally served as the benchmark for further analyses. Numerous additional US studies have been undertaken at differing levels of aggregation since Lewis's early work and the (sometimes widely differing) results of such studies are usefully surveyed by both Parsley (1980) and Lewis (1983).<sup>6</sup> As far as the UK is concerned, a study by Pencavel (1974) analysed data relating to twenty-nine industries in 1964 and found that in the case of manual workers, there existed a union/non-union differential that varied between zero (in industries which did not engage to any significant extent in plant bargaining) to 14 per cent (in industries that did). As already noted, more recent UK studies have analysed the union coverage data provided by the New Earnings Surveys and, in particular, Mulvey's (1978) findings from his analysis of 77 MLH industries suggested the existence in 1973 of a differential for adult male manual workers of somewhere between 16 and 35 per cent. Subdivision of Mulvey's coverage data subsequently confirmed Pencavel's earlier broad finding that the size of the differential varies according to whether bargaining is of a work place opposed to a national character. Mulvey's results suggested the presence of a zero differential

in the case of industries covered by national agreements only and the existence of substantial differentials in the cases of those workers covered by both national and supplementary agreements and those covered by company, district or local agreements.<sup>7, 8</sup>

In the Irish case, the only study so far available in Walsh and Whelan's (1976) analysis of a set of micro data derived from the official records of the previous earnings of a sample of those qualifying for redundancy payments under the Redundancy Payments Acts during the first quarter of 1972. Using the standard methods outlined above, Walsh and Whelan (1976, p. 210) estimated the magnitude of the Irish union/non-union differential as being to the order of 16 per cent, but as they rightly pointed out, the fact that their sample refers to redundant workers may well mean that their result is not representative of the size of the differential elsewhere in the economy.

#### Unions and Resource Allocation

Related to the influence of unions upon relative wages is their effect on the allocation of resources within an economy. The standard analysis here is due to Rees (1963), who constructs a model in which an economy, faced with a perfectly inelastic supply function of homogenous labour, is divided into two sectors, both of which are initially non-unionised. A union is then assumed to appear, to organise one of the sectors and by so doing to raise the wage in the unionised sector above the previous common, competitively determined, wage.

Rees considers the displacement effect discussed above and assumes that the workers who have lost their jobs prefer to work in the non-union sector at the non-union wage in preference to remaining unemployed and also that labour demand conditions remain unchanged in both sectors. On the basis of these assumptions, Rees demonstrated that an output or welfare loss arises from the displacement of workers from the union

to the non-union sector. The loss occurs because the resulting increase in labour supply to the non-union sector depresses the competitively determined wage rate in this sector and thus results in workers now being employed where their marginal productivity is lower than previously. Rees shows that in the case where the labour demand schedules in each sector are approximately parallel, the output loss is approximately equal to one half of the absolute union/non-union differential multiplied by the quantity of labour displaced from the union to the non-union sector.

On the basis of an earlier estimate, due to Lewis (1963a), of the elasticity of employment in the union relative to the non-union sector with respect to the union/non-union differential, Rees estimated that the output losses due to the misallocative effects of trade unions in the US economy in 1957 amounted to approximately 0.14 per cent of that year's GNP.

Rees's evidence refers to the USA and to the economy wide allocative effects of trade unions. Although no similar economy wide studies have been undertaken for either Ireland or the UK, evidence from a recent and closely related study of the distribution and efficiency effects of trade unions in the British coal-mining industry between 1900 and 1913 suggested that around 9 million more tons of coal would have been produced in 1913 if the proportion of miners unionised had remained at its 1900 level and that, other things being equal, a totally unionised coalfield would have produced approximately 22 per cent less output than a completely non-unionised one (Pencavel, 1977, pp. 138-145).

#### General Equilibrium Approaches

One particular limitation of the Rees analysis is its partial equilibrium nature. In a later study, Johnson and Mieszkowski (1970) explicitly recognised the general equilibrium nature of the problem, with unionisation increasing the price of the products

of unionised industries relative to those of non-unionised goods, thus causing a decrease in output and a substitution of capital for labour in the unionised sector. The labour released by this process is then absorbed into the non-union sector of the economy where it brings about an employment re-adjustment which influences wages and prices in both the non-union and union sectors of the economy.

To analyse these general equilibrium adjustments, Johnson and Mieszkowski use the standard two-commodity, two-factor model of international trade theory, treating unionisation as a tax on the labour of the unionised industry which has the effect of shifting the demand curve away from that industry. Using this analysis, they demonstrate that the precise effects of unionisation in terms of income distribution depend crucially on whether the unionised sector of the economy is more or less capital intensive than the non-unionised sector. If the unionised sector of the economy is more capital intensive they conclude that 'unionised labour must gain, while non-unionised labour may also gain, if it is more labour-intensive, non-unionised labour must lose, while unionised labour may also lose' (1970, pp.546-7). Notice also, that after a detailed discussion of the precise implications of various different plausible US values of the parameters of the problem (the size of the union relative wage effect, the magnitude of capital-labour substitution elasticities in each sector and so on) Johnson and Mieszkowski tentatively conclude that the major part of any union gain in terms of income distribution is made at the expense of the non-union workforce and not at the expense of earnings on capital. For extensions of the Johnson and Mieszkowski analysis of the effects of unions, using duality theory, see Diewert (1974, 1974a).

## Chapter 3

## SOME ECONOMETRICS OF IRISH TRADE UNION GROWTH

Introduction

In a series of recent publications Bain and Elsheikh (see, in particular, their 1976 study) have examined the determinants of the rate of growth of aggregate trade union membership in Australia, Sweden, the United Kingdom<sup>1</sup> and the United States and found some encouraging empirical support for a simple econometric model of the union growth process. In this paper we use their model in an analysis of trade union growth in the Republic of Ireland. While the Bain and Elsheikh model is not without its critics (see, in particular, Richardson, 1977, 1978 and the response by Elsheikh and Bain, 1978), it nevertheless provides a convenient starting point for this analysis of the Irish experience.<sup>2</sup>

This chapter is organised as follows: in section 1, the principal hypotheses of the Bain and Elsheikh model are briefly summarised and in section 2, the results obtained by estimating the model against Irish data covering the period 1943 to 1977 are presented and discussed. In section 3, a number of additional hypotheses, some relating to the particular institutional characteristics of the Irish labour market, are tested and in section 4, the structural stability of the estimated model is investigated. In the final section, the main findings of the chapter are summarised.

Principal Hypotheses to be Tested

The dependent variable whose variation Bain and Elsheikh seek to explain is the annual proportional rate of change of trade union membership (which we denote by  $\Delta T$ ) and there are four principal hypotheses to their model. These concern, respectively,

the influence on union growth of the following variables; the rates of price and money wage inflation, unemployment (and/or its rate of change) and union density (defined in the usual way as the ratio of actual to potential union membership).

In their analysis, Bain and Elsheikh see changes in trade union membership as being determined by changes in both the propensity and opportunity to unionise and on the basis of the arguments sketched out below, they argue that the dependent variable is expected to be positively related to the rates of change of retail prices and wages and negatively related to both union density and the level and/or rate of change of unemployment.<sup>3</sup>

Bain and Elsheikh argue that workers are more likely to enter and to seek to remain in trade union membership during periods of rapid price inflation as they attempt to achieve money wage improvements of sufficient magnitude to protect their real standard of living from being eroded by rising prices. This they term a 'threat effect.' In addition, they argue that if price rises are seen as an index of the general 'prosperity of industry' they may also influence the opportunity to unionise. Employers may be more willing to concede demands for improvements in wages and other conditions of work during periods of rising prices partly because the opportunities for passing on increased costs may be more favourable and partly because they may fear the disruption of profitable production by industrial action in the cause of furthering unionisation. This is referred to as the 'prosperity effect.' Both threat and prosperity effects work in the same direction and suggest a positive relationship between  $\Delta T$  and the rate of price inflation.

They also argue that workers are more likely to join and remain in unions during periods when money wages are rising rapidly, as during such periods they tend to credit increased money wages to unions and hope that by joining or remaining with them they will do at least as well in the future. This they term the 'credit effect.'

It is also argued that union growth can be expected to be negatively related to union density, primarily because of the presence of a 'saturation effect' which arises because the higher is density, the greater will be the difficulties of increasing membership further since there will be fewer workers left to recruit and because those who remain are likely to have a lower propensity and ability to unionise.<sup>4</sup>

Lastly, it is argued that membership can be expected to grow more slowly, or to fall, when unemployment is high or rising because the opportunities for extending union membership are less favourable during such periods. There are several arguments giving rise to this hypothesis. Bain and Elsheikh argue that given the low level of aggregate demand prevailing at such times, employers are more able to resist the spread of unionism as the (opportunity) costs in terms of foregone output resulting from disruptions of production in the cause of extending unionism tend to be low. From the employees' viewpoint, it is also argued that unemployment influences the propensity of workers to become and remain union members via its effects on the expected benefits of membership relative to its costs. Those becoming unemployed tend to withdraw from the union (possibly after some time lag, as many unions permit members to be in arrears for a number of months before withdrawing their membership) as they may feel that, being unemployed, membership has little benefit to offer them and as membership costs typically rise in relation to their incomes. In addition, some employed workers may become reluctant to join unions during periods of high unemployment in fear of antagonising their employers to the extent of jeopardising their job in a period of excess labour supply. Furthermore, it is also argued that employed members may also tend to withdraw from membership during periods of high and rising unemployment as they estimate that under prevailing economic conditions, the scope for union won collective-bargaining advances is limited, to the extent that the expected benefits from membership (in the form of union-won improvements in wages and conditions of work) are no longer sufficient to outweigh membership costs.

On the basis of the above arguments we can, by following Bain and Elsheikh in assuming linearity and specifying the density variable with a one period lag, write the basic estimating equation of the model as:

$$\Delta T_t = a_1 + a_2 \Delta P_t + a_3 \Delta W_t + a_4 U_t + a_5 D_{t-1} + u_t \quad (3.1)$$

where subscripts denote time and where

$\Delta T$	=	the annual proportional rate of change of trade union membership
$\Delta P$	=	rate of price inflation
$\Delta W$	=	rate of wage inflation
$U$	=	the level (and/or the rate of change) of the unemployment rate
$D$	=	union density
$u$	=	a disturbance term

On the basis of the above a priori arguments, the expected signs of the coefficients are as follows:

$$a_2, a_3 > 0 \text{ and } a_4, a_5 < 0$$

### Empirical Results

Table 3.1 summarises the results that were obtained by estimating model (3.1) by ordinary least squares regression against annual Irish data spanning the period 1943 to 1977. (Full details of data sources and definitions are given in the Data Appendix.)

Equation (3.1.1) corresponds to the basic equation of the Bain and Elsheikh model (equation 3.1 above) and as can be seen these empirical results provide some support for their model. The wage inflation and union density terms are both correctly



signed and significantly different from zero at the 1 per cent level. Although incorrectly signed, the unemployment term is not significantly different from zero.

One interesting feature of the results reported in equation (3.1.1) refers to the estimated coefficient of the price inflation term. This coefficient is wrongly signed and significant at the 1 per cent level. As we will see below, this result of a negative and highly significant relationship between union growth and the rate of price inflation emerges in each of our estimated equations. An interpretation of this result is offered later in this chapter.

It seems reasonable in the Irish context to expect changes in the size of the labour force to have exerted a positive influence on union growth. Notice, however, that this positive influence is implicitly captured in the Bain and Elsheikh model by the union density term. In the model, an increase in the size of the labour force results, ceteris paribus, in a decrease in union density which in turn (according to the hypothesised negative influence of union density on union growth) results in an increase in the rate of union growth.

In terms of its overall performance, equation (3.1.1) is able to explain over 60 per cent of the variation of Irish trade union growth over the study period and the computed Durbin-Watson statistic provides no evidence of first-order serial correlation.

### Union Growth and Unemployment

The possible existence of a lag between becoming unemployed and withdrawing from union membership (through unions tending to allow their unemployed members to go into arrears for some period) has already been noted and in an attempt to capture this effect, equation (3.1.1) was re-estimated with a one period lag specified on the unemployment term. The results obtained are reported in equation (3.1.2). As in the previous estimated equation, both density and the rate of wage inflation are correctly signed and significant at the 1 per cent level, while the rate of price inflation is incorrectly signed and significantly different from zero. The  $R^2$  increases to just less than 0.64 and the Durbin-Watson statistic provides no evidence of autocorrelation. Once again, the unemployment term has the incorrect sign but although its 't' value is in excess of that of its unlagged counterpart, it fails to achieve significance at the 5 per cent level.

Table 3.1: Determinants of Union Growth in the Republic of Ireland, 1943-1977

Equation Number	ESTIMATED COEFFICIENTS										R <sup>2</sup>	D-W	
	Intercept	$\Delta P_t$	$\Delta W_t$	$D_{t-1}$	$U_t$	$U_{t-1}$	$U_{t-2}$	$\Delta U_t$	$U_t - U_{t-1}$	$D_{t-1}^{-1}$			
3.1.1	17.257* (5.2624)	-0.73912* (3.3371)	0.53340* (3.8153)	-0.37748* (5.6082)	0.04227 (0.87991)							0.6246*	2.0045**
3.1.2	15.895* (4.5716)	-0.77765* (3.6585)	0.55609* (4.0189)	-0.36793* (5.5315)		0.06577 (1.3666)						0.6375*	2.0098**
3.1.3	15.612* (3.8118)	-0.77552* (3.5791)	0.55462* (3.9308)	-0.36537* (5.2063)		0.056596 (0.68136)	0.013674 (0.13670)					0.6377*	2.0010**
3.1.4	17.767* (5.835)	-0.62041* (3.2552)	0.55521* (3.9325)	-0.36596* (5.3681)				-0.03587 (0.97189)				0.6267*	1.8962**
3.1.5	17.817* (5.7619)	-0.62163* (3.2386)	0.55703* (3.8862)	-0.36775* (5.3581)					-0.06768 (0.78288)			0.6226*	1.8854**
3.1.6	18.504* (6.2807)	-0.63916* (3.3739)	0.53359* (3.8306)	-0.37754* (5.6296)								0.6149*	1.9095**
3.1.7	-9.7248* (3.7478)	-0.69731* (3.5498)	0.53331* (3.6704)							502.4* (5.1599)		0.581*	1.7727**

Notes: In this and subsequent tables, figures in parentheses are 't' values. An asterisk denotes a coefficient which is significantly different from zero at the 1% level and a double asterisk denotes the absence of first-order autocorrelation at the 5% level.

Equation (3.1.3) reports the results which were obtained when the unemployment rate lagged two periods was added to specification (3.1.2). The estimated coefficients of both unemployment terms in this equation are non-significant and the results relating to the signs and significance of the other estimated coefficients are the same as in the preceding two estimated equations. Once again, the computed Durbin-Watson statistic provides no evidence of autocorrelation.

Bain and Elsheikh argue that either the level and/or the rate of change of the unemployment rate might influence the dependent variable and in order to test whether an unemployment change rather than level variable should be specified as an explanatory variable, it is necessary to test whether the estimated coefficient of the level of the unemployment rate is significantly different from minus one times that of its own lagged value. The appropriate econometric procedure here is to test the restriction that the coefficients of these two variables sum to zero. Application of the standard 't' test of this linear restriction (see Johnston, 1972, pp.155-6) to equation (3.1.3) fails to reject the null-hypothesis that the true coefficients are equal and opposite. However, since neither individual coefficient is significantly different from zero, this result implies that the lagged first difference of the unemployment rate enters with a zero coefficient, i.e., that it is not a significant determinant of union growth. The same finding emerged when this procedure was repeated with respect to the current and one period lagged unemployment rate, implying the non-significance of the (unlagged) first difference of the unemployment rate as an explanatory variable. These findings are borne out by equations (3.1.4) and (3.1.5) which explicitly include respectively the proportionate and absolute rates of change of the unemployment rate. In both cases the unemployment change variable is correctly signed but insignificant.

The absence of any relationship between unemployment and union growth in Ireland is perhaps somewhat surprising when one recognises that significant relations

were found in each of the four countries studied by Bain and Elsheikh. However, it is interesting to notice that although Bain and Elsheikh (1976, p.72) found the unemployment term to be both significant and correctly signed in the UK's case for their complete sample period (i.e., 1893-1970), Bain's re-estimation of a number of versions of the model for the UK for the sub-period 1943-1977 (i.e., the period analysed in this chapter) reveals some evidence to suggest that for this sub-period, unemployment in the UK's case either failed to exert a significant influence on union growth or possibly even exerted a significant, but perverse influence.<sup>5</sup>

In a recent paper, Price and Bain (1983) have suggested that the influence of unemployment on union growth may well be more complex than previously suggested. In this paper they explicitly recognise the likely influence of the threat of unemployment, arguing that (particularly for white collar workers) as the unemployment rate rises, the increased threat of unemployment may exert a positive impact on union growth, as faced with emerging uncertainties, workers tend to join unions for reasons of self protection.

In view of the above argument which demonstrates the conflicting influences which the unemployment variable might exert on union growth, the direction of its net influence is arguably ambiguous. Indeed, it may even turn out to be not significantly different from zero as opposing influences cancel each other out and this is one possible interpretation of our findings regarding the non-significance of the various unemployment variables in the Irish case.

#### Unemployment: Stocks versus Duration

Price and Bain (1983) also explicitly consider the implications of the now well known sub-division of the unemployment stock into its inflow and duration components. They point out that during periods when unemployment durations are 'low' (as was, for example, the case in the UK up until about the mid 1970s: for evidence see Cripps and

Tarling (1974), Tarling (1978, p.33), Sapsford (1981, p.174)) fluctuations in the unemployment rate might be expected to exert little or no influence on trade union growth. The argument here is simply that during periods when unemployment durations are low, workers (given the fact that many unions permit unemployed members to go into arrears for several months before withdrawing their membership) are likely to be re-employed within this period of grace and thus to be back in 'good-standing' before their membership actually lapses.

However, during periods characterised by higher unemployment durations, as appear to have been present during the late 1970s and early 1980s in both the UK (Stern, 1982; Bailey and Parikh, 1983) and Ireland (Short, 1980; Hughes and Whelan, 1982; O'Mahony, 1982), we may perhaps reasonably expect unemployment to exert a significant impact on union growth, as unemployed members are less likely during such periods, to find themselves back in employment before their membership lapses. In both the Irish and UK cases this hypothesis concerning the differential impact on union growth of given rates of unemployment according to the magnitude of their duration components, is certainly worthy of further investigation.

#### Summary of Results so far

Equation (3.1.6) reports the estimates which were obtained when non-significant variables were excluded from the vector of independent variables and these provide a summary of our findings so far; showing that Bain and Elsheikh's basic model is able to explain over 60 per cent of the variation in Irish union growth over the period 1943-1977. The wage inflation and density variables are both significant at the 1 per cent level and both signed in accordance with a priori expectations. The price inflation term is, however, incorrectly signed and significant at the 1 per cent level and there is no evidence of first-order autocorrelation.

### Alternative Density Specifications

In their discussions of the likely influence of density on union growth, Bain and Elsheikh (1976, pp.68-77) acknowledge the possible non-linearity of the relationship between these two variables and go on to specify, for the UK, equations utilising density specified in reciprocal and quadratic forms. The regressions reported in Table 3.1 were re-estimated with density specified first in a reciprocal form and second in a quadratic form, with the quadratic form being specified to allow us to test for the possibility that the enforcement effect, discussed above, dominates at low levels of density while being outweighed by the saturation type effect at higher density levels. In the reciprocal case, the overall configuration of results with respect to the signs and significance of the coefficients of the other explanatory variables remained unchanged, as did the orders of magnitude of both  $R^2$  and Durbin-Watson values. However it should be noted that the results obtained with density specified in quadratic form were somewhat less supportive of the density effect, with density in a number of formulations failing to exert a significant effect on union growth. In addition, these results provided no evidence to suggest the existence of a significant enforcement effect.

Equation (3.1.7) includes density in reciprocal form and is presented as being representative of the results obtained with a non-linear density variable. Judging the three alternative density formulations according to their contribution to the overall explanatory power of the model, the quadratic form is markedly inferior to both the linear and reciprocal forms. Comparing equations (3.1.6) and (3.1.7) we see that the linear formulation gives rise to slightly more satisfactory values of both  $R^2$  and Durbin-Watson statistics and for this reason is to be preferred.

### Price Inflation, Real Wages and Union Growth

As already noted, one feature of our results is the negative (contrary to Bain and Elsheikh's hypothesis) and significant effect of price inflation on Irish union growth

and in order to offer an interpretation of this result we follow the spirit of Bain and Elsheikh's own analysis by explicitly recognising the two sided (worker and employer) nature of the unionisation process.<sup>6</sup> One possible interpretation of the observed negative relation is that over the study period the propensity of workers to unionise increased with price inflation in the fashion hypothesised by Bain and Elsheikh but that at the same time, the resistance of employers to the further spread of unionisation increased to such an extent that it more than offset the increase in workers' propensity to unionise. The analytical parallels here between the two-party nature of the union growth process and that of strike activity have been clearly stated by Richardson (1977, p.280) and a formal treatment of this sort of issue in the latter context is given by Sapsford (1978).

In the Irish context there are perhaps good reasons to expect the existence of a positive relation between employer resistance to the spread of unionisation and the rate of price inflation rather than the negative association implied by Bain and Elsheikh in their discussion of the 'prosperity effect' outlined above. One important characteristic of the Irish economy is its high degree of inter-relatedness with that of the UK (see, for example, Kennedy and Bruton, 1975) with over 50 per cent of Ireland's trade over the study period being with the UK. This, taken together with the very pronounced tendency for the Irish rate of price inflation to exceed that of its main trading partner, the UK, suggests that it is perhaps reasonable to argue that during periods of rapid price inflation Irish employers, fearing the likely increased costs associated with conceding further improvements in wages and other conditions of employment (with the consequent further erosion of their competitive position vis-à-vis the UK as its main trading partner) tended to strongly resist the further spread of unionisation.<sup>7</sup>

In summary, one plausible interpretation of the observed negative association between price inflation and Irish union growth is that it represents the outcome of a

process in which the resistance of employers to the spread of unionisation increased in response to competitive considerations during periods of rising price inflation to such an extent that it more than offset any tendency there was for the unionisation propensity of workers to increase during such periods.<sup>8,9</sup>

Inspection of the estimated coefficients of the rates of wage and price inflation reported in Table 3.1 show their absolute values to be quite close. If the estimated coefficient of the rate of wage inflation were found to be not significantly different from minus one times that of the rate of price inflation, then this would clearly imply that the model be re-specified with the rate of change of real wages replacing the separate wage and price inflation terms.<sup>10</sup> However, for each of the equations reported in Table 3.1 we are led to reject at the 5 per cent level the restriction that the parameters of the wage and price inflation terms sum to zero. For example, application of the usual F test for this linear restriction to equation (3.1.6) yields an F ratio of 14.5684 with (1,31) degrees of freedom and since the tabulated value of F with these degrees of freedom at the 5 per cent level is approximately 4.1 we are led to reject the null hypothesis that the coefficients of the price and wage inflation are equal and opposite.

#### Estimation Problems

There is something of a debate in the union growth literature (see, for example, Bain and Elsheikh 1976, pp.117-118, Elsheikh and Bain 1978, pp.99-100 and Richardson 1977, p.280 and 1978, p.104) regarding the appropriate method of estimating the parameters of union growth functions. The results so far reported in this chapter, like those reported by Bain and Elsheikh, have all been obtained by ordinary least squares regression. Possible simultaneity problems arise because  $\Delta W$  and  $\Delta P$  might themselves be influenced by, while also influencing,  $\Delta T$ . The possibility that a relation exists between  $\Delta T$  and  $\Delta W$  is a well known one in the wage inflation literature



(see, in particular, Hines, 1964, 1968, 1969) and has been much discussed, criticised and defended since the publication of Hines' well known paper in 1964 (see, in particular, Purdy and Zis, 1974 and Dogas and Hines, 1975) and the possible influence of  $\Delta P$  then follows via the usual sort of price equation.

To guard against possible simultaneity problems a variety of experiments were conducted in which the Bain and Elsheikh model of union growth was set in a simultaneous equation framework. Although the specification and estimation of a full simultaneous equation model of the wage-price-union growth system is outside the scope of the present study, our experiments with the specification and inclusion of a variety of plausible wage and price equations (including those specified by Hines, 1964 and Ashenfelter, Johnson and Pencavel, 1972)<sup>11</sup> provided no evidence of simultaneous equation bias, with the estimates of the parameters of the union growth function which were obtained by appropriate simultaneous equation estimation techniques proving to be of virtually unchanged magnitude and unchanged in respect of their significance. In view of these findings we follow Bain and Elsheikh in the remainder of this chapter and employ ordinary least squares as our method of estimation.<sup>12</sup>

#### Some Additional Hypotheses

One additional hypothesis which has recently been tested against UK data concerns the relationship between union growth and profits (Burkitt and Bowers, 1978). The argument here, which is in the spirit of Kaldor (1959), is that workers are more likely to join unions during periods of high or rising profits because they judge that the scope for union won gains is increased during such periods. Evidence in support of this hypothesis was found by Burkitt and Bowers (1978) in a study of UK data covering the period 1924 to 1966. The validity of this study has been challenged on a variety of grounds by Elsheikh and Bain (1979) and as far as the role of profits is concerned, they

argue that the above hypothesis is unsatisfactory because of its 'indirect nature' (1979, p.452), although it is conceded that there may be a role for profits as an additional explanatory variable in that they may prove to be a more satisfactory proxy than the rate of price inflation for the general prosperity of industry and therefore prove more able to capture the so called 'prosperity effect' referred to above. Whether one subscribes to either the Burkitt and Bowers or Bain and Elsheikh view of the role of profits, it is important to notice that Bain and Elsheikh's re-estimations of their own model for the UK did show that the inclusion of a profit variable resulted in a significant improvement in their model's explanatory power.

Accordingly, the equations reported in Table 3.1 were re-estimated with profits included as an additional explanatory variable: the expected sign on profits term being positive. The results thus obtained are summarised in Table 3.2. Equations 3.2.1 - 3.2.4 report the results which were obtained by adding a profits term to equations (3.1.6) and (3.1.7). Equations (3.2.1) and (3.2.2) report, respectively, the results obtained by the addition of gross profits ( $\Pi$ ) and real profits ( $\Pi/P$ ) to specification (3.1.6). In both cases the estimated coefficient of the profit term is positive (in accordance with expectations) and significantly different from zero at the 1 per cent level. In neither equation is there any evidence of serial correlation but in terms of goodness of fit, equation (3.2.2) (the real profits version) is to be marginally preferred. Equations (3.2.3) and (3.2.4) correspond to (3.1.7) above and report the results which were obtained with density specified in its reciprocal form. In both cases, the profit coefficient is correctly signed and significant (at the 5 and 1 per cent levels respectively) although the Durbin-Watson statistic for (3.2.4) falls just inside the indeterminate range at the 5 per cent level. In terms of overall performance as judged by both  $R^2$  and Durbin-Watson criterion, equation (3.2.2), which uses density in its linear form together with real profits, is to be marginally preferred.<sup>13</sup>

Table 3.2: Determinants of Union Growth in the Republic of Ireland, 1943-1977: Further Analysis

Equation Number	ESTIMATED COEFFICIENTS							R <sup>2</sup>	D-W
	Intercept	$\Delta P_t$	$\Delta W_t$	$D_{t-1}$	$D_{t-1}^{-1}$	$\Pi_t$	$(\Pi/P)_t$		
3.2.1	21.334* (7.2164)	-0.85764* (4.3705)	0.48994* (3.7642)	-0.43664* (6.5662)		0.012758* (2.4827)		0.6805*	2.0687**
3.2.2	22.000* (7.7688)	-0.78632* (4.5249)	0.36572* (2.7248)	-0.51018* (7.0020)			34.117* (3.1243)	0.7094*	1.9104**
3.2.3	-11.263* (4.4219)	-0.91014* (4.3501)	0.49250* (3.5593)		578.03* (5.8900)	0.11952 (2.1936)		0.6389*	1.8864**
3.2.4	-15.492* (4.7280)	-0.84485* (4.4545)	0.38499* (2.6435)		662.03* (6.0725)		30.170* (2.5703)	0.6566*	1.7042
3.2.5	21.340* (6.9649)	-0.85754* (4.2918)	0.48982* (3.6855)	-0.43673* (6.4183)		0.12776 (2.3318)	-0.010947 (0.010791)	0.6805*	2.0677**

### Political Influences

In their study of the US experience, Ashenfelter and Pencavel (1969, p.439) specify as an explanatory variable the proportion of Democrats in the US House of Representatives. The logic of this variable is to proxy pro-labour sentiments, which they argue influence both workers' responses to union recruitment activities and the amount of legislation conducive to union growth. Empirical analysis of the US data between 1904 and 1960 shows the coefficient of this variable to have the expected positive sign and to be significantly different from zero.

Arguably the nearest things to labour (type) governments experienced in the Republic of Ireland during the study period were a number of coalitions which included Labour Party representatives and in an attempt to test whether similar political factors might have exerted a significant influence on Irish union growth we specified as an additional explanatory variable, a dummy variable (denoted by  $POL_t$ ) taking the value of unity when such a coalition was in power and zero otherwise.

The results that were obtained by addition of this dummy variable to specification (3.2.1) are set out in equation (3.2.5) from which it is seen that the political variable is incorrectly signed and not significantly different from zero. Repetition with the political dummy added to specifications (3.2.2) to (3.2.4) also showed its estimated coefficient to be not significantly different from zero. In summary, our results present no evidence to suggest that political (in the Ashenfelter and Pencavel sense) factors exerted a significant influence on the rate of union growth in post-war Ireland. However, since there is no obvious pro versus anti trade union divide in Irish party politics this result is not an altogether surprising one.

### National Wage Agreements and Union Growth

One particular characteristic of the wage determination process in post-war Ireland has been the existence of a series of highly centralised wage bargains known as National Wage Agreements (for a detailed description of these see O'Brien, 1981).

It is perhaps reasonable to expect that the rate of union growth in Ireland might have been influenced by the existence of these agreements, with one possible line of reasoning being that during periods when National Wage Agreements were in operation the credit effect referred to above was strengthened as workers became more aware of the wage bargaining activities and achievements of unions. This argument therefore suggests the existence of a positive relation between union growth and the incidence of National Wage Agreements. Alternatively as Bain and Elsheikh suggest (1976, pp.109-110), it might be argued that the presence of a highly centralised collective wage bargaining system is likely to have a negative influence on union growth, since the more centralised the wage bargaining system, the fewer are the bargains and the more remote will these be from the workers, with the consequence that they will be less conscious of the gains achieved by union bargaining and hence less likely to credit these to unions.

In order to test these alternative hypotheses, we specified as an additional explanatory variable a dummy variable (denoted by  $NWA_t$ ) which took a value of unity during periods when an Agreement was in operation and zero otherwise. According to the Bain and Elsheikh hypothesis, the expected sign of this variable is negative, while the alternative hypothesis specified above predicts a positive sign.

Equation (3.2) below summarises the results which were obtained and it can be seen from this equation (which, apart from the profits variable, corresponds directly to equation (3.1.3) in Table 3.1 above and to equation (5) in Bain and Elsheikh's (1976, p.72) own analysis of the UK data) that although the coefficient of  $NWA_t$  is negatively signed in accordance with Bain and Elsheikh's hypothesis it is not significantly different from zero.<sup>14</sup> Re-estimation of each of the equations set out in Table 3.2 with the inclusion of the variable  $NWA_t$  confirms this finding; with the estimated coefficient of  $NWA_t$  failing to achieve significance in any equation.

$$\begin{aligned}
\Delta T_t = & 30.994^* - 0.80429\Delta P_t^* + 0.4052\Delta W_t^* - 0.10485U_{t-1} \\
& (4.2588) \quad (3.939) \quad (2.747) \quad (0.98821) \\
& - 0.049309U_{t-2} - 0.53229D_{t-1}^* + 0.027050\Pi_t^* - 0.37621NWA_t \quad (3.2) \\
& (0.48711) \quad (5.66721) \quad (2.4848) \quad (0.31454)
\end{aligned}$$

$$R^2 = 0.7052^*, \quad D-W = 2.0904^{**}$$

(\* denotes significance at 1% level, \*\* denotes absence of auto-correlation at the 1% level)

### A Possible Non-Linearity

Finally, Bain and Elsheikh present some evidence to suggest that for the UK, the relation between the rate of price inflation and union growth is non-linear, with the positive influence of price inflation on union growth apparently occurring at a lower rate when the rate of price inflation equals or exceeds 4 per cent per annum (Bain and Elsheikh, 1976, p.70). This is indeed a surprising result when one recognises that evidence in the inflationary expectations literature (see, in particular, Carlson and Parkin, 1975) suggests that the degree of perception of inflation increases as the inflation rate increases. Given that the argument underlying Bain and Elsheikh's inclusion of a price inflation term is, in large part, specified in terms of the threat effect on workers' living standards posed by price inflation, it is perhaps reasonable in the light of the above evidence regarding the perception of inflation to expect the slope of the (partial) relation between price inflation and union growth to increase rather than decrease as price inflation exceeds some threshold level and workers become more acutely aware of the effect of inflation on their living standards. This point is not, however, discussed by Bain and Elsheikh, who instead interpret their evidence in terms of a complacency on the part of workers to inflation which they argue occurs once inflation exceeds some critical level (1976, p.84).

In order to test for the possible existence of a non-linearity (of which ever direction) in the relationship between price inflation and union growth we followed Bain and Elsheikh's methodology and employed slope-dummies on the price inflation term. The equations reported in Table 3.2 were re-estimated with slope dummies (denoted by  $S_t$ ) specified on the price inflation term, defined so that these become operational when price inflation exceeded some specified level.<sup>15</sup> This 'threshold level' for the operation of the slope dummies was increased from 3 to 15 per cent per annum and in each case the estimated coefficient of the slope dummy was found to be positive but in no case did we find the existence of a significant coefficient on the slope dummy. In other words, our findings provide no evidence of the existence of a non-linearity in the relationship between price inflation and union growth in Ireland.<sup>16</sup>

This finding is illustrated by equations (3.3) and (3.4), which correspond directly to equation (3.1.3) in Table 3.1 above and to equation 6 in Bain and Elsheikh's (1976, p.72) analysis of the UK and which report some of the results which were obtained with the threshold for the operation of the slope dummy set at 4 and 12 per cent per annum respectively. The full set of results for thresholds in the range  $3 \leq a \leq 12$  per cent is summarised in Table 3.3.

Equation (3.3) (Threshold for Price Inflation Slope Dummy Variable = 4 per cent per annum)

$$\begin{aligned} \Delta T_t &= 15.52^* - 1.1166\Delta P_t^* + 0.53991\Delta W_t^* + 0.052264U_{t-1} + 0.014373U_{t-2} \\ &\quad (3.7626) \quad (3.7626) \quad (3.7684) \quad (0.62367) \quad (0.14273) \\ &- 0.35113D_{t-1}^* + 0.33265S_t, R^{2*} = 0.64559, D-W^{**} = 1.9952 \\ &\quad (4.8135) \quad (0.78438) \end{aligned}$$

Table 3.3: Determinants of Union Growth in the Republic of Ireland, 1943-1977: Analysis with Price Inflation Slope Dummy

Equation Number	Threshold rate of price inflation (a)	ESTIMATED COEFFICIENTS							R <sup>2</sup>	D-W
		Intercept	$\Delta P_t$	$\Delta W_t$	$U_{t-1}$	$U_{t-2}$	$D_{t-1}$	$S_t$		
	(% per annum)									
3.3.1	3	15.224* (3.5884)	-1.0472 (1.6249)	0.54279* (3.7307)	0.049109 (0.57190)	0.021618 (0.20994)	-0.35228* (4.5798)	0.27116 (0.44839)	0.6403*	1.9728**
3.3.2	4	15.52* (3.7626)	-1.1166* (3.7626)	0.53991* (3.7684)	0.052264 (0.62367)	0.014373 (0.14273)	-0.35113* (4.8135)	0.33265 (0.78438)	0.64559*	1.9952**
3.3.3	5	15.329* (3.6696)	-0.62649 (1.8011)	0.57873* (3.8751)	0.065822 (0.76786)	0.010431 (0.10285)	-0.37296* (5.1548)	-0.16553 (0.55204)	0.5416*	1.9477**
3.3.4	6	14.460* (3.2863)	-0.58684 (1.7678)	0.57511* (3.9737)	0.053165 (0.63436)	0.031392 (0.30336)	-0.36282* (5.1255)	-0.20106 (0.75449)	0.6449*	1.9250**
3.3.5	7	13.293* (3.1206)	-0.43092 (1.4150)	0.57312* (4.1485)	0.051798 (0.63877)	0.058697 (0.57716)	-0.36770* (5.3694)	-0.36581 (1.5720)	0.6671*	1.9223**
3.3.6	8	14.278* (3.4362)	-0.53405 (1.9222)	0.55135* (3.9637)	0.07593 (0.91369)	0.027045 (0.27294)	-0.37742* (5.4117)	-0.27061 (1.3589)	0.6601*	1.8961**
3.3.7	9 or 10	14.707* (3.3813)	-0.67869* (2.5902)	0.56224* (3.9344)	0.067966 (0.79443)	0.025382 (0.24766)	-0.37257* (5.1992)	-0.13728 (0.67134)	0.6434*	1.9096**
3.3.8	11	15.473* (3.6018)	-0.75566* (2.8410)	0.55344* (3.8481)	0.058184 (0.68179)	0.016267 (0.15701)	-0.36707* (5.0617)	-0.025663 (0.13344)	0.6379*	1.9876**
3.3.9	12	15.911* (3.8545)	-0.84* (3.6526)	0.53391* (3.7153)	0.045249 (0.53586)	0.026137 (0.25755)	-0.36447* (5.1706)	0.13583 (0.86681)	0.6472*	1.9611**

Note: The equality of the results for thresholds of 9 and 10 per cent reflects the fact that over the study period, no observation had an annual price inflation rate in the range greater than 9 but less than or equal to 10 per cent.



Equation (3.4) (Threshold = 12 per cent per annum)

$$\begin{aligned} \Delta T_t = & 15.911^* - 0.84\Delta P_t^* + 0.53391\Delta W_t^* + 0.045249U_{t-1} + 0.026137U_{t-2} \\ & (3.8545) \quad (3.6526) \quad (3.7153) \quad (0.53586) \quad (0.25755) \\ & - 0.36447D_{t-1}^* + 0.13583S_t, \quad R^{2*} = 0.6472, \quad D-W^{**} = 1.9611 \\ & (5.1706) \quad (0.86681) \end{aligned}$$

(\* denotes significance at the 1 per cent level, \*\* denotes the absence of autocorrelation at the 5 per cent level.)

### Structural Stability

The above analysis has so far considered the complete 1943 to 1977 period. The possibility that economic variables may be connected by relationships having the property that the parameters of the relations may be subject to discontinuous change has been widely discussed in the recent econometric literature (for a literature survey see Goldfeld and Quandt, 1973) and in the context of the present analysis it is of interest to notice that Sheflin, Troy and Koeller (1981) have recently analysed the structural stability of both the Bain and Elsheikh and Ashenfelter and Johnson models, as applied to the US data, using these sort of techniques and found some evidence of structural instability in both models.

The problem of estimating the parameters of a system obeying two separate regimes has been considered within a regression framework by Quandt (1958) who devised a maximum likelihood method of estimating the location of the switch from the first to the second regime and we used this procedure in order to investigate the structural stability of the Bain and Elsheikh model as applied to Ireland over the period 1943-1977. Applying Quandt's maximum likelihood procedure to the various equations reported in Tables 3.1 and 3.2, we find, virtually without exception, that 1962 emerges as the maximum likelihood estimate of the date at which the switch between regimes occurred. Having estimated the location of the switching point, it was necessary to test whether a switch actually occurred during the period under

study and following Goldfeld and Quandt's (1973) suggestion we employed the Chow (1960) test for this purpose. In no case did the results of Chow's F test lead us to reject the null-hypothesis that the post 1962 observations obeyed the same structural relation as the pre-1962 ones. In short, and in contrast to Sheflin et al's. (1981) finding for the USA, our analysis provides no evidence of structural instability in the Bain and Elsheikh model as applied to the Irish case.

### Summary and Conclusions

In this chapter we have tested the Bain and Elsheikh model of the determinants of trade union growth against post war Irish data. Our results provide confirmation of their hypotheses regarding the influence on union growth of the rate of wage inflation and union density, but provide no evidence to suggest that either the level and/or rate of change of the unemployment rate influenced union growth. In addition, we found (contrary to the hypothesis of Bain and Elsheikh) the existence of a negative and significant relationship between the rate of price inflation and union growth. An interpretation of this finding, based on an explicit recognition of the high degree of inter-relatedness between the economies of Ireland and the UK, was offered.

A number of additional hypotheses were tested and of these, the only one to find support concerned the influence of profits, with our results showing that profits exerted a significant positive influence on union growth: a finding also evident in some previous work on the UK experience. Finally, the structural stability of the model was investigated using the switching regression model, the results of which provided no evidence of structural instability.

## Chapter 4

## A RESEARCH AGENDA

Introduction

We began this paper by noting the distinct lack of research into the economics of Irish trade unions. Although it is hoped that the analysis of this paper has thrown some light on a number of questions in this area, there are still many hypotheses and models which are well established in the literature but which have yet to be put under test in the Irish context. In this brief concluding chapter we therefore present, in the form of a suggested agenda for future research in the area, a listing of various hypotheses which might reasonably be explored in future research into the economics of Irish trade unions.

Agenda

1. As noted, the specification of an adequate theory of trade union behaviour is a longstanding problem in labour economics. An application of the Stone-Geary (flexible) union utility function approach, as developed by Dertouzos and Pencavel (1981), to the activities of a specific Irish trade union or group of unions, or indeed to the behaviour of the Irish Congress of Trade Unions as a coalition of member unions, may well throw some valuable light on exactly what objectives Irish trade unions actually seek to achieve.
2. There is some degree of disagreement between economists as to the direction of net effects of trade unions on labour productivity and an exploration of the relative magnitudes in Ireland of the 'feather bedding' effect and the 'exit-voice' trade-off seems worthy of empirical investigation.

3. The relative wage effects of trade unions have been a subject of much research in both the UK and US cases, and this issue seems in need of much more detailed analysis in the Irish context. Although constraints with existing data would seem to require the collection of a variety of alternative series (particularly a series analogous to the UK New Earnings Survey coverage series) such research would usefully consider the following issues: (a) the relation between types of agreements and the magnitude of relative wage effects; (b) the influence of cyclical movements in economic activity on the size of the union relative wage effects, with particular reference to the possible existence of rigidities of the Rees-Friedman sort; and (c) an analysis of suitably constructed micro data on membership and wages using the recently proposed mixed-logit procedures in an attempt to measure relative wage effects, while taking proper account of both potential simultaneity problems and the binary nature of union membership from the individual's viewpoint.

4. Allied to questions 2 and 3 above, is the issue of the extent to which unions have influenced resource allocations in the Irish economy. It would certainly be worth exploring this question in some depth (using the methods employed elsewhere by Johnson and Mieszkowski (1970) and Diewert (1974, 1974a)) in an attempt to gauge whether the allocative effects of Irish unions have been greater, less than or approximately equal to the allocative effects which they appear to have exerted in other economies.

The particular area where this paper has sought to make some specific contribution is in the determinants of post-war Irish union growth and although this analysis has answered some questions, it has also raised a number of issues worthy of further exploration. These are as follows.

5. As we have considered the performance of one, albeit possibly the most widely accepted, model of union growth it would clearly be worth investigating its performance in the Irish case relative to its various rivals, primarily the model specified by Ashenfelter and Johnson (1969).

6. An interpretation of the perverse relation in Ireland between the rate of price inflation and union growth was put forward and this might usefully be explored further, possibly using as an alternative independent variable, a suitably specified measure of Ireland's rate of price inflation relative to that of the UK as its main trading partner. Alternatively, it may conceivably be the case that the price term is somehow capturing influences not elsewhere represented in the model and this is a possibility worthy of further investigation.

7. The absence of a significant relation between Irish unemployment and union growth has also been discussed and this result might usefully be explored further. One possibility here is to explicitly test the unemployment duration (as opposed to stock) hypothesis discussed in Chapter 3, particularly once a sufficient run of observations characterised by high durations becomes available to allow proper econometric assessment of this possible effect. In addition, if we interpret emigration as an extension of employment, it would also be useful to explore the influence of a net migration variable.

8. Although we could find no evidence to suggest that political factors (of the Ashenfelter and Johnson sort) exerted a significant influence on Irish union growth, it may well be worth extending the investigation of this issue further, by considering the question of whether specific items of legislation (as distinct from the complexion of the government in office) may have exerted a significant influence on the rate of union growth. Such an investigation might initially employ the dummy variable approach in an attempt to capture the possible impacts of relevant legislations.

9. In view of the expectational nature of Bain and Elsheikh's 'threat effect' hypothesis concerning the influence of price inflation on union growth, it might be of interest to employ some of the now standard techniques of modelling inflationary expectations to test this hypothesis more directly. Despite the fact that Smith's (1980, pp.104-7) re-estimation of the Bain and Elsheikh model for the UK's case with an unanticipated inflation variable (derived by assuming the expected inflation rate to be determined by a distributed lag of the previous three years actual inflation rates) replacing the actual

rate of price inflation, appeared to offer little improvement over Bain and Elsheikh's own results, such an approach would seem to offer a useful starting point for further investigation of this hypothesis in the Irish context.

## DATA APPENDIX\*

Sources and Definitions

Each rate of change variable was defined in the following way:

$$\Delta X_t = \frac{X_t - X_{t-1}}{X_{t-1}}$$

Trade Union Membership (T)

Data on membership of unions in Ireland were obtained from the Annual Reports of the Irish Registrar of Friendly Societies (Dublin: various issues), to which were added data relating to membership of branches in the Republic of Ireland of UK registered unions, as published in the Department of Employment Gazette (HMSO, London: various issues).

Retail Prices (P)

This index was derived by linking together the Cost of Living Indices (1941-1953) and the Consumer Price Index (1953-1977). Sources: Irish Trade Journal and Statistical Bulletin (ITJSB) and Irish Statistical Bulletin (ISB).

Wages (W)

This index refers to total weekly earnings per wage earner. Data for the period 1942-1949 were obtained from the ITJSB and refer to 'certain industries' which together account for approximately eighty per cent of employment in the production of transportable industrial goods. Data from 1950 onwards were obtained from ISB and refer to the results of the Quarterly Inquiries covering all transportable goods industries.

Unemployment (U)

These data refer to persons recorded as unemployed on the 'Live Register' expressed as a percentage of the employed plus the unemployed and were obtained from ITJSB and ISB.

Union Density

This is defined as  $T/E$  where  $E$  denotes the number of employees in non-agricultural employment plus those recorded as unemployed. Data on the number of employees for the period 1951-1966 were obtained from Hughes, 1972, (Table A.6), while data for the period 1967-1977 were obtained by updating and re-estimating Hughes' own data using 1971 Census results and data presented in the 1978 and 1980 issues of Economic Review and Outlook (Central Statistics Office, Dublin). There being no estimates of numbers at work in non-agricultural employment prior to 1951 (other than for the census years of 1936 and 1946) these data were estimated by the method described in Hughes (1972, Table A.6, Note 2).

Profits (II)

Data for the years 1944 to 1977 refer to the 'Trading profits of companies (including corporate bodies) before tax' and were obtained from ISB and National Income and Expenditure (CSO, Dublin). The 1943 figure was obtained as a predicted value from a linear regression of  $\Pi$  on corporation tax returns (Source: Reports of the Revenue Commissioners, Dublin).

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\* Copies of the actual series are available from the author on request.



## FOOTNOTES

1. Some exceptions here are the studies by O'Mahony (1964, 1965) and McCarthy, O'Brien and Dowd (1975).
2. Two other dimensions of trade union economic behaviour not considered in this paper concern their role in the wage inflation process and the way in which wages are set by collective bargaining between unions and employers. Both of these topics represent significant research areas in their own right and some theoretical issues relating to the latter topic are considered in Sapsford (1979), while the empirical performance of a wage bargaining model in explaining post-war Irish data is discussed in Sapsford (1979a). As far as the former topic is concerned, one standard approach is that due to Hines (1964, 1968, 1969, 1971) and the performance of this model has already been explored in the Irish context by Cowling (1966). As is well known, the criticisms of this model are many and varied (see, for example, Purdy and Zis, 1974 and the response by Dogas and Hines, 1975) and in the Irish case, the contributions by Mulvey and Trevithick, (1970, 1972, 1972a, 1974), Geary (1976) and Geary and McCarthy (1976) are of relevance.

Chapter 2

1. See Diewert (1974, pp.319-322) for a concise survey of a number of aspects of early economic thought regarding trade unions.
2. See, in particular Brown and Medoff (1978), Clark (1980, 1980a), Freeman (1980), Freeman and Medoff (1979) and Medoff (1979). Useful critical surveys of this literature can be found in Addison (1982) and Addison and Barrett (1982).
3. Surveys of a number of issues involved in this debate can be found in Rees (1962, pp.48-64), Sapsford (1973, pp.67-80) and Sapsford (1981, pp.87-101).

4. More plausible rent maximising models can be found in, for example de Menil (1971) and Rosen (1970).
5. For a recent extension of the Cartter-Fellner analysis which sees the union as representing a commune and investigates the influence on wages and employment of cyclical movements in the economy, see McDonald and Solow (1981).
6. For instance, Ashenfelter's (1978) study of 1973 US data suggested the presence of differentials of 4 per cent for craftsmen in durables manufacturing and 4 per cent for construction operatives, while for all workers the differential was estimated as 15 per cent, breaking down into 15.5 per cent for white men, as opposed to 22.5 per cent for black males. In an earlier study of the 1973 US data, Ryscavage (1974) estimated a differential of 12 per cent for all workers, with the figures for white and black males being 8 per cent to 27 per cent respectively.
7. A useful summary of other recent UK findings can be found in Metcalf (1977, pp.159-162). See also Stewart (1983).
8. One particular feature to emerge from empirical studies of the magnitude of the union/non-union differential is its significant counter-cyclical behaviour, giving rise to what is sometimes termed the 'Rees-Friedman wage rigidity' hypothesis. According to this hypothesis, non-union wages are more responsive to fluctuations in labour demand conditions over the cycle than are union wages because upward adjustments in the latter during upswing are subject to lags and rigidities which arise because union workers are 'locked in' to collective agreements (typically, in the US case, of the fixed duration kind), while downward movements in the union money wage are slowed down if not altogether prevented. For evidence of the presence of such an effect in the UK's case, see Demery and McNabb (1978).

Chapter 3

1. See also Bain and Elsheikh (1982) for a disaggregated study of UK union growth.
2. A related econometric study of Irish trade union growth can be found in Sapsford (1983).
3. In this section we present only a brief summary of the Bain and Elsheikh model: for a more complete specification the reader should consult Bain and Elsheikh (1976, pp.58-70). For an alternative approach which emphasises the relative costs and benefits of trade union membership see Ashenfelter and Pencavel (1969).
4. Alternatively and contrary to this effect, Bain and Elsheikh (1976, p.68) recognise that there may be an enforcement effect (possibly operating most strongly at low levels of density) which results in a positive relation between density and union growth. It is argued that this contrary effect might arise because the propensity and ability to unionise may increase as employers find it more difficult to retaliate against individual members and as the ability of unions to persuade employees to unionise (through social coercion or because of union security provisions) may increase as density increases. We return to the possible existence of enforcement effects later in this chapter when we specify various non-linear density terms.
5. I am indebted to Professor Bain for making these so far unpublished results available to me. Notice, however, that it might perhaps be argued that the absence of a significant relation between unemployment and union growth might not be so surprising in the light of the Geary and Jones (1975) analysis which showed that unemployment in a highly open economy, such as Ireland, may not be an appropriate measure for excess demand pressures in the labour market, plus the fact that in the Irish case, emigration might originally be interpreted as an extension of unemployment (Geary and Jones, 1975).
6. Re-estimation of the model with several observations deleted, with the  $\Delta W$  term excluded, with a lagged price inflation term substituted for the current one and in Bain and Elsheikh's (1976, p.77) real-wage form provided no evidence to suggest that the perverse sign on the price inflation term is a reflection of multicollinearity problems between the wage and price inflation terms.
7. For a related discussion, see O'Mahony (1965) for study of the economic aspects of industrial relations in Ireland.

7. Recall that evidence suggests the existence in Ireland of a union/non-union (cont'd) earning differential to the order of 16 per cent (Walsh and Whelan, 1976, p.210).
8. Some preliminary investigations using as explanatory variables measures of Ireland's inflation rate relative to the UK's suggest that relative inflation may have exerted a significant influence on Irish union growth.
9. One weakness of this argument is that it effectively assumes an asymmetry on the part of employers regarding their responsiveness to price and wage inflation; since if employers are able to react in the hypothesised manner to variations in the rate of price inflation, it is not obvious why they do not respond similarly to variations in the rate of wage inflation. However, if we are to remain within the model as specified by Bain and Elsheikh it is relevant to notice that the proposed interpretation is consistent with the model, since Bain and Elsheikh present no hypothesis regarding the operation of an employer prosperity effect on the wage inflation side. If one is unwilling to accept this view, the proposed interpretation still holds if one is willing to assume that any responsiveness there is in employer unionisation resistance to changes in the rate of wage inflation is of insufficient magnitude to outweigh the credit effect on the workers' side.
10. As can be seen from Table 3.1, our results would, if this restriction were found to hold, imply the existence of a positive relation between real wage changes and union growth. Interestingly in the specification of an alternative model designed to explain union growth in Australia, Sharpe (1971) hypothesised and found support for the existence of a negative relation between (some distributed lag of) real wage changes and union growth; his argument being that worker discontent and hence the desire to unionise in order to protect real wages, is likely to increase when real wage growth declines. For detailed discussion of this model, see Bain and Elsheikh (1976, pp.45-55).

11. Notice that Cowling's (1966) study of the determinants of wage inflation in Ireland between 1949 and 1963 found little support for the Hines model.
12. A number of interesting econometric issues arise in the analysis of disaggregated (particularly individual) data relating to union membership. See, in particular, Schmidt and Strauss (1976), Olsen (1978), Schmidt (1978) and Lee (1978).
13. These equations were re-estimated with the various unemployment variables considered above in the context of Table 3.1 included as explanatory variables but once again unemployment in each and every case failed to achieve significance.
14. Notice that Bain and Elsheikh (1976, pp.109-110) report some evidence in support of their hypothesis from a comparison of the Swedish experience with that of other countries analysed in their study.
15. These slope dummies were defined in the usual way as

$$S_t = \Delta P_t \cdot I_t$$

where  $I_t$  is an intercept dummy defined such that

$$I_t = 1 \text{ when } \Delta P_t > a \text{ per cent per annum}$$

$$I_t = 0 \text{ otherwise}$$

and  $a =$  specified threshold level of the annual price inflation rate where  $3 \leq a \leq 12$  and  $a$  is integer.

16. This exercise was also repeated with an intercept as well as the (price inflation) slope dummy included, but in no case did either dummy achieve significance.

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