

Competition Policy and Employment: An Application to Ireland

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Abstract: This paper models an open economy with a competitive traded sector and a monopolistic non-traded sector. Competition policy in the non-traded sector can reduce the price of traded goods and increase welfare but only if the labour market clears continuously. If insider workers have "power" over entrepreneurs, competition policy merely enables wage increases (or increased profit taking) in both sectors. In general, the analysis highlights the fact that unemployment is not just a labour market phenomenon. Competition policy may be cumulative in its effect so that the returns are more likely to be realised in the longer term. The model is discussed in the context of the Irish Economy.

I INTRODUCTION

A great deal has been written about Irish unemployment. One of the distinctive features of recent research is a recognition that domestic supply-side factors play some role in explaining the unusually high unemployment rate. This research has been accompanied by policy prescriptions advocating microeconomic reform. This paper attempts to sketch the background theory relating to the role of microeconomic reform in reducing the level of unemployment. Thus, for example, it attempts to formalise the thinking behind the Culliton Report (1992). Competition policy has been chosen as an example of a microeconomic reform. It has typically received less

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attention than taxation, is straightforward to model, and the intuition of many of the results extends readily to issues such as taxation. An open economy has been selected for exposition, but the results apply equally to the case of a closed economy.

The paper develops a two-sector general equilibrium model of an economy with monopolistic competition (Cournot) in the input industry and perfect competition (Bertrand) in outputs. The input industry is thought of as a non-traded sector and the output industry as a traded sector producing for export. The rationale for monopolistic competition in non-traded inputs is that this sector is not threatened by competition from abroad in the form of imports: competition policy is often directed towards non-traded goods. The distinction is not absolute, however, and there may be traded goods which are characterised by monopolistic practices and non-traded goods which are produced in highly competitive markets.¹ O'Rourke (1991) provides a comprehensive account of the distinction between traded and non-traded goods and services.

The demand for the final output of the economy on the world market is assumed to be downward sloping rather than infinitely elastic.² This assumption is designed to capture the fact that many traded goods are differentiated. More inelastic demand can be thought of as a proxy for niche marketing of exports, e.g., the demand for Waterford Glass might be more inelastic than that for standard un-carved table glass. The market for carved glass is an example of a traded good possibly better described by monopolistic competition.³

The analysis suggests that the effectiveness of competition policy depends on conditions in the labour market. If the labour market clears, output and welfare increase. If, however, labour supply is very inelastic or labour demand is sluggish (say, because of lack of entrepreneurship), competition policy leads to increased wages without any change in the country's competitive position. Thus it results in redistribution from the (possibly entrepreneurial) owners or shareholders of firms in the non-traded sector to labour in both sectors, with the allocations to labour between the sectors determined by relative bargaining power. With elastic labour supply and a mechanism for job creation, competition policy would result in increased output, improved competitiveness, and higher welfare.

A final conclusion is that the more labour intensive is the production of traded goods, the less will the country's competitive performance depend on

1. Entry barriers, for example, may have the effect of making traded goods non-traded.

2. Similar results hold with infinitely elastic demand and are outlined in the Appendix.

3. Interchanging the sectors does not affect the results: for example, imperfect competition in traded products (e.g., cut glass) and perfect competition in non-traded products (e.g., hair-dressing).

competition policy in the non-traded sector. Correspondingly, policies to reduce costs in the economy should perhaps concentrate on non-labour inputs when these play a large role in the production technology.

II EQUILIBRIUM IN THE ECONOMY

There are two sectors. The non-traded sector uses labour as a sole input to produce capital which is, in turn, a non-traded input in the production of traded goods. The traded sector uses both labour and capital to produce final output, all of which is exported. Notionally, the demand of domestic consumers is satisfied by imported goods. In any economy, some inputs to the production process will be non-traded and the model focuses exclusively on these. These assumptions make it possible to focus on the effect of monopolistic competition in markets for inputs on the overall performance of the economy.

2.1 *The Traded Sector*

The traded sector uses two inputs, labour, L , and capital, K . Capital is a non-traded input in the production process and is bought at price r . The wage rate is w . The technology is Leontief, with a (constant returns to scale) production function

$$Q(K, L) = \text{Min}(L, \alpha K) \quad (1)$$

The parameter α measures the "labour intensity" of the production process: for $\alpha > 1$, production of traded goods is "labour intensive". The traded sector is modelled as a representative firm with production function (1) and a cost constraint

$$wL + rK \leq C. \quad (2)$$

Optimisation gives $Q = L = \alpha K$, and $C = w\alpha K + rK$ which implies demands for inputs

$$K = \frac{C}{\alpha w + r} \quad (3)$$

$$L = \frac{\alpha C}{\alpha w + r}. \quad (4)$$

The elasticity of demand for capital (i.e., non-traded goods) is

$$\eta = -\frac{\partial K}{\partial r} \frac{r}{K} = \frac{r}{\alpha w + r}. \quad (5)$$

Firms in the traded sector are Bertrand-type price setters giving

$$P = \frac{C}{Q} = \frac{dC}{dQ} = w + \frac{r}{\alpha}. \quad (6)$$

Demand in the traded sector, $Q(P)$, is decreasing and elastic (over relevant prices),

$$\varepsilon = -\frac{Q'P}{Q} > 1. \quad (7)$$

The total revenue of the traded good sector, $PQ(P)$, is equivalent to C ,

$$C = \left(w + \frac{r}{\alpha} \right) Q(P). \quad (8)$$

The (Hicksian) demand for capital function (from Equation (3)) is

$$K(w, r, Q) = \frac{1}{\alpha} Q \left(w + \frac{r}{\alpha} \right). \quad (9)$$

2.2 The Non-Traded Sector

The non-traded sector is characterised by quantity-setting among n firms, i.e., Cournot competition. Production of non-traded or capital goods uses one input, labour, in a simple one-to-one technology. Both the capital output and the labour input are denoted K . The cost function with a one-to-one technology is linear and of the form

$$C(K) = (w + s) K. \quad (10)$$

where $w + s$ is the unit cost of labour to the non-traded sector. The variable s represents extra slack or union power in the non-traded sector.⁴ That is, firms in the non-traded sector pay more for labour than firms in the traded

4. The model allows union power in both sectors as demand is not infinitely elastic. Extra union power in the non-traded sector could be due to the super-normal profits.

sector by amount s . A justification for this might be that unionised labour in the non-traded sector may use its bargaining power to extract some of the monopolistic rent earned by the firms in that industry. Another explanation is that trade union power is greater in many non-traded sectors as, for example, in the electricity industry. The variable s is taken to be exogenous. The slack variable could also reflect labour hoarding in the non-traded sector or the fact that work practices could lead to lower productivity which could be dually measured by a higher wage. Slack might also be due to managerial inefficiency. Each of these is distinctly possible, but none is modelled explicitly in this paper.

Let k be the output of one of the n identical firms in the non-traded industry, $K = nk$, and let $r(K)$ be the inverse demand function for non-traded goods. The output level chosen by a firm is

$$k = \arg \max \{kr(K) - (w + s)k\}. \quad (11)$$

The first order condition is

$$kr' + r - w - s = 0. \quad (12)$$

The elasticity is $\eta = -\frac{r}{Kr'}$, so that $kr' = -\frac{r}{n\eta}$.

Thus

$$r = \frac{w + s}{\left(1 - \frac{1}{n\eta}\right)}. \quad (13)$$

This is the standard Cournot mark-up formula. For $n\eta > 1$, the markup is positive. It is decreasing in n , i.e., more firms increase competition and reduce the price of non-traded goods. Similarly, a higher elasticity of demand will reduce the monopoly power of the non-traded sector and yield lower prices.

Combining Equations (5) and (13) gives

$$r = \frac{w + s}{\left(1 - \frac{1}{\frac{nr}{(\alpha w + r)}}\right)} = \frac{nr(w + s)}{(nr - \alpha w - r)} \quad (14)$$

$$\Rightarrow r = \frac{\alpha w + nw + ns}{n - 1} \quad (15)$$

Equation (15) gives the price of non-traded goods in terms of the exogenous parameters of the model. The markup is positive unless there is perfect competition in the sector ($n = \infty$). Higher wages or higher slack in the non-

traded sector increase the price of non-traded goods. More competition in the sector, represented by increasing the number of firms, reduces the price, as does higher elasticity of demand for traded goods. The price of goods in the traded sector is positively related to the degree of labour intensity in the traded sector. A more labour intensive traded sector reduces the elasticity of demand for non-traded goods, and thereby enables higher prices.

2.3 *Welfare and Economic Performance*

The price of traded goods depends on the price of non-traded goods, and can similarly be written as a function of the exogenous parameters of the model. Recall $p = w + \frac{r}{\alpha}$. Therefore

$$P = w + \frac{\alpha w + n(w + s)}{\alpha(n - 1)} = \frac{\alpha w + w + s}{\alpha\left(1 - \frac{1}{n}\right)} \quad (16)$$

From this, the price of traded goods depends positively on the wage rate in the economy and on the level of slack. Higher labour intensity in the production of traded goods reduces the price, as it makes the sector less dependent on the non-traded sector. A higher number of firms or a higher elasticity of demand would tend to reduce the price.

The welfare of the economy is measured by the total revenue of the traded sector, that is

$$W = PQ(P) \quad (17)$$

and changes in welfare depend on the elasticity

$$\frac{dW}{dx} = (Q + PQ') \frac{dP}{dx} = Q(1 - \varepsilon) \frac{dP}{dx} \quad (18)$$

where x represents any exogenous parameter. Given that the demand is elastic, anything which reduces the price of traded goods will increase welfare in the economy.

The total wage bill in the economy is $wL + (w + s)K$ and the total profit in the non-traded sector is $(r - w - s)K$. The total income of the economy is

$$wL + rK = w \frac{\alpha C}{\alpha w + r} + r \frac{C}{\alpha w + r} = C = PQ.$$

Thus the total income of the economy is equal to the total output. An appendix outlines this in more detail and looks at the consumption and labour supply functions which make up the remainder of the general equilibrium model.

2.4 The Labour Market

The overall demand for labour is

$$L + K = \frac{(\alpha + 1)C}{\alpha w + r} = \frac{(\alpha + 1)}{\alpha} Q(P) = \frac{(\alpha + 1)}{\alpha} Q\left(\frac{\alpha w + w + s}{\alpha\left(1 - \frac{1}{n}\right)}\right)$$

The supply of labour, L_s is increasing in w and decreasing in the aggregate profit of the non-traded sector (income effect on labour supply),⁵ hence

$$L_s = L_s(w, \pi, s). \quad (19)$$

Equilibrium in the labour market is given by a wage which satisfies

$$\frac{(\alpha + 1)}{\alpha} Q\left(\frac{\alpha w + w + s}{\alpha\left(1 - \frac{1}{n}\right)}\right) = L_s(w, \pi, s). \quad (20)$$

For monotonically decreasing demand and labour supply as described, the equilibrium wage will be unique.

III COMPETITION POLICY

3.1 An Equilibrium Story

First, suppose that the economy is a frictionless market clearing economy in which the labour market clears continuously, and consider what happens as competition policy increases the number of firms. Differentiating Equation (20) implicitly gives

$$\frac{dw}{dn} = \frac{\overbrace{-\frac{dQ}{dP} \left(\frac{(\alpha + 1)(\alpha w + w + s)}{\alpha^2 n^2 \left(1 - \frac{1}{n}\right)^2} \right)}^{+ve} \overbrace{-\frac{\partial L_s}{\partial \pi} \frac{d\pi}{dn}}^{-ve}}{\underbrace{\frac{\partial L_s}{\partial w} - \frac{(\alpha + 1)^2}{\alpha^2 \left(1 - \frac{1}{n}\right)} \frac{dQ}{dP}}_{+ve}}. \quad (21)$$

5. More generally, dividend income would include both part of the return to capital in all sectors plus the super-normal profits in the monopolistic sectors. Here, the former does not arise as labour is the only input in the production of non-traded goods.

Competition policy increases the wage (i.e., $\frac{dw}{dn} > 0$) if the first term on the numerator dominates, as happens if income effects on labour supply from the reduction in the profitability of the non-traded sector are small. This outcome appears likely and is reinforced if the slack is decreasing in the number of firms in the non-traded sector as this both reduces the size of any income effects and increases the labour demand in the non-traded sector as the real wage there is relatively lower.

Clearly, the level of employment in the economy is increased regardless of whether the wage increases or decreases and this can be seen in Figure 1. Labour demand has shifted out and more labour is supplied. The income effect on labour supply means that the non-labour share of income (i.e., dividend income) is lower and this income effect shifts out labour supply. Overall, the increase in employment in the economy will be greater, the less is the wage increased.

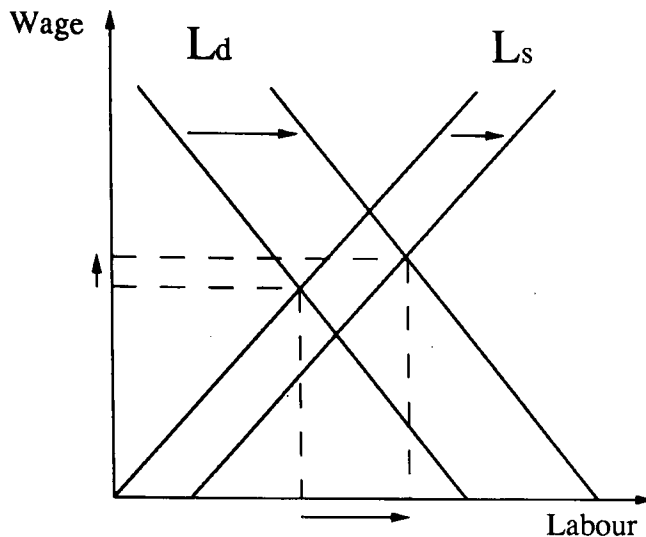


Figure 1: *The Equilibrium Story*

Next consider the effect of competition policy on the price of traded goods. Using Equations (16) and (20) gives

$$\frac{(\alpha + 1)}{\alpha} Q(P) = L_s \left(\frac{\alpha}{\alpha + 1} \left(1 - \frac{1}{n} \right) P - s, \pi \right)$$

Differentiating and rearranging gives

$$\frac{dP}{dn} = \frac{-\left(\overbrace{\frac{\partial L_s}{\partial \pi} \frac{\partial \pi}{\partial w}}^{+ve} + \overbrace{\frac{\partial L_s}{\partial w} \frac{\alpha}{\alpha+1} \frac{P}{n^2}}^{+ve}\right)}{\underbrace{\frac{\alpha}{\alpha+1} \left(1 - \frac{1}{n}\right) \frac{\partial L_s}{\partial w}}_{+ve} - \underbrace{\frac{\alpha+1}{\alpha} \frac{dQ}{dP}}_{-ve}} < 0$$

Competition policy reduces the price of traded goods and hence increases welfare.

3.2 A Vertical Labour Supply Story

Suppose that the labour supply curve is vertical at a particular level of employment, denoted F . Such might be the case if the economy were in a situation of full employment or, perhaps, overheating. In this case, the wage is set by labour demand and output and welfare are determined by the level of employment.

In equilibrium, $F = L + K = \frac{(\alpha+1)C}{\alpha w + r}$, with $C = PQ$ and $P = \frac{\alpha w + r}{\alpha}$. Hence

$$Q(P) = \frac{\alpha}{\alpha+1} F, \quad (22)$$

so that both output and the price level are determined by F .

From Equation (22)

$$P = \frac{\alpha w + w + s}{\alpha \left(1 - \frac{1}{n}\right)} = Q^{-1} \left(\frac{\alpha}{\alpha+1} F \right) \quad (23)$$

$$\Rightarrow w = \frac{\alpha \left(1 - \frac{1}{n}\right) Q^{-1} \left(\frac{\alpha}{\alpha+1} F \right) - s}{\alpha+1}. \quad (24)$$

The wage is determined by the demand for labour which in turn depends on the demand for traded goods and the degree of competition in the non-traded sector.

Now consider competition policy. Increasing the number of firms has no effect on the level of output or on the price of traded goods so the only effect is to increase the wage since $\frac{dw}{dn} > 0$. This is shown in Figure 2 and competition policy in such a case redistributes income from the shareholders of firms in the non-traded sector to workers in the whole economy.⁶ In this situation, the

6. This is not insignificant if the group losing out has lobbying power. Here participants in the non-traded sector lose and arguably these have considerable lobbying power, especially in the case of public services.

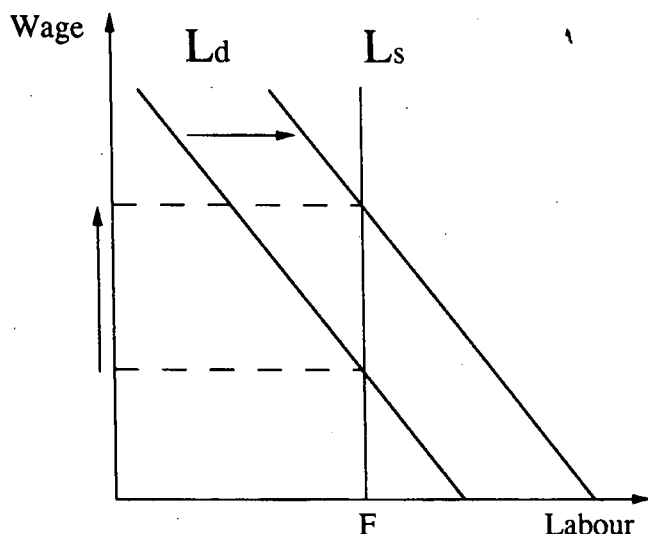


Figure 2: Vertical Labour Supply

real wage increases and the return to entrepreneurship or share-holding in the non-traded sector falls.

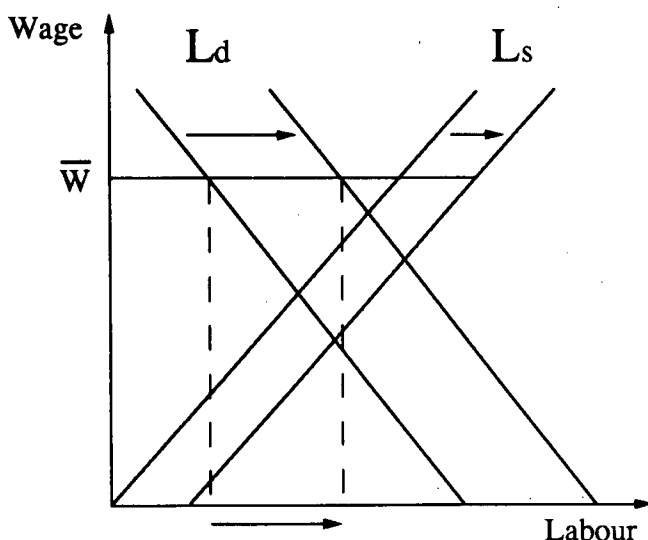
Government policy to increase labour force participation in this case has a beneficial effect on welfare as

$$\frac{dP}{dF} = \left(\frac{\alpha}{\alpha + 1} \right) Q^{-1'} < 0$$

Wages fall and output and employment increase. This would be the case whether or not there is competition policy, but clearly the effectiveness of competition policy is enhanced if increases in labour supply reduce the upward pressure on wages.

3.3 A Sticky Wage Story

Suppose next that the wage is fixed at a certain level (say $\bar{w}$) which involves excess supply of labour and does not adjust to clear the market, as is depicted in Figure 3. Competition policy increases labour demand, and employment and output rise. The income effect on labour supply means that unemployment does not fall by the full amount of the increase in employment. This scenario might be thought to represent the Irish economy — for example, wages might be inflexible for insider-outsider reasons — however, it would not appear to be a complete story.

Figure 3: *The Sticky Wages Case*

3.4 *An Insider-Outsider-Entrepreneurship Story*

Consider finally a situation in which existing workers have power over others in the economy. Typically the insider-outsider story assumes that the inside workers have more bargaining power over outside workers (i.e., the unemployed). Here this idea is extended to give them a type of bargaining power over the entrepreneurial sector of the economy.

Recall the mechanism by which competition policy works in the equilibrium story. Competition policy reduces the price of non-traded goods and thereby reduces input costs to the traded sector. The increased profitability in the traded sector at existing prices induces entry.⁷ Output increases, the price of traded goods falls and welfare is improved. Central to this mechanism is the fact that profitability induces entry which dissipates super-normal profit.

Suppose instead that workers or unions representing them move faster than new entrepreneurs. That is, the workers (in either or both sectors) take advantage of the increased profitability and bargain for higher wages.⁸ In the extreme case where they appropriate the entire profit in the form of a wage

7. A different story needs to be told if existing firms can increase output, as required for Bertrand under-cutting. For instance, long run constant returns to scale could be consistent with decreasing returns in the short-run, i.e., sudden increases in output are costly.

8. Another possibility is that the economy lacks entrepreneurship. Thus supernormal profits might persist in the traded sector for some time without entry.

increase, there would be no effect on employment, as illustrated Figure 4. The dashed labour demand schedule represents the level of labour demand which would exist in the equilibrium story — the equilibrium labour demand. However, bargaining by workers leads the wage to rise to where the equilibrium labour demand is exactly equal to the number of current insiders (point A in the figure). In this outcome, there is unemployment and the wage exceeds the market clearing level. It is similar in effect to the case with the vertical labour supply in the sense that government policy to increase the level of employment is required. Here, however, government policy would be different and should persuade entrepreneurs to hire labour rather than to increase labour force participation.

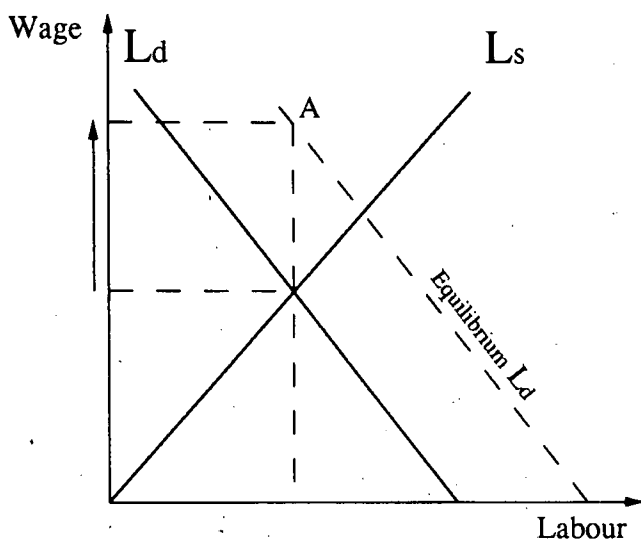


Figure 4: *The Insider-Outsider-Entrepreneurship Story*

In this scenario, competition policy will not be effective because the labour market is not functioning properly and enables existing workers to have strong bargaining power both over outsider workers and outsider entrepreneurs, i.e., permits rent-seeking. In a sense, there is a barrier to entry in the traded sector which originates in the labour market. Competition policy will be effective only if accompanied by measures to increase employment by reducing the power of insiders.

Whether this situation might occur depends on the adjustment mechanisms of the economy. Just as the equilibrium story is unconvincing in reality, so is the extreme assumption that workers would appropriate the entire benefit of cost reductions in the non-traded sector. It seems more likely that

some balance between these two polar cases would be likely in practice. Which effect would be stronger depends in some sense on whether unions move faster in response to profit opportunities in the economy than do entrepreneurs, and this in turn would reflect many social and institutional features of the economy.⁹

IV APPLICATION TO THE IRISH ECONOMY

4.1 *Which Story Suits the Irish Economy?*

Much has been written about the causes of Irish unemployment including external demand factors and labour supply problems (McGettigan, 1992 provides a review). However, attention has recently been focused on micro-economic factors and, in particular, on insufficient demand for labour and weak incentives to entrepreneurship as likely causes of unemployment (Fingleton, Matthews, and McAleese, 1992). In this context, the insider-outsider-entrepreneurship model seems to deal with some of the relevant issues although it is not nearly a complete account. Two factors are particularly relevant.

First is the issue of *strong unions*. This model lacks a precise account of how unions bargain over entrepreneurs for any rent in the economy. It has been clear that the Irish economy possesses strong trade unions and those in the public sector may have considerable bargaining power over the private sector. Thus, for instance, a public sector union might be able to appropriate increased profit in some part of the economy by bargaining for a wage increase in the knowledge that this could be paid for by appropriate taxation in the relevant sector.¹⁰ More generally, there is agreement that the Irish economy is characterised by rent-seeking activities so it seems reasonable that some part of any increased competitiveness could be captured by unions.¹¹

The second issue is the sluggishness of entrepreneurship. This could relate either to the reluctance of existing firms to expand¹² or to the absence of people willing to establish new enterprises. An enticing explanation relates to the *allocation of talent* in the economy. Murphy, Shleifer and Vishny (1991) argue that the most able young people become rent-seekers rather than producers, and use the example of lawyers and engineers respectively. In the model above, the most talented (i.e., entrepreneurial) individual would seek

9. Competition policy, in reducing profits in the non-traded sector, might not encourage entrepreneurship in other sectors.

10. I am grateful to Francis O'Toole for discussion on this point.

11. The word is used liberally: for example, it should include the farmers' lobby.

12. It has been argued that certain labour market inflexibilities may restrict employment both by existing employers and by new enterprises. See McAleese (1992, pages 68-70).

to work in the relatively comfortable non-traded sector of the economy rather than to become entrepreneurs in the traded sector.

In summary, this analysis of competition policy suggests a link between unemployment and the issues of entrepreneurship and rent-seeking and this appears particularly relevant to the Irish economy.

4.2 Which Markets are Relevant?

It is appropriate to ask to what extent does the non-traded sector provide inputs for the traded sector which cannot be bought elsewhere, and why are such inputs not produced under competitive conditions. A number of categories exist, and the following list is not meant to be exhaustive. In each case, there is a barrier to entry and competition is absent — a necessary condition for a monopolistic behaviour.

- State sponsored monopolies: Examples include telephone, postage and electricity. The barrier to entry is due to legislation and the lack of competition is due to monopoly. The government faces a conflict of interest between implementing marginal cost pricing and achieving high profitability and high employment in the sectors.¹³
- Labour services with highly organised unions: Of particular interest are those such as legal, medical and other professional services. The rôle of professional organisations in the regulation of quality often extends to or enables restricting of entry.
- Special cases: Banks have not typically been competitive. Regulation by the central bank does not concentrate on price cutting for prudential and other reasons. Recently the threat of entry has increased and it is interesting that the banks' reaction has had effects in the labour market. The recent intense competition for high-interest bearing accounts is an interesting development in this context.
- Public services: Many public/government services play a rôle as inputs to the production process. There is no entry and no competition in the supply of such services. In many countries, this is now changing with increased emphasis on efficiency in the public service and the use of competitive measures such as contracting out and yard-stick competition.

13. The recent debate about Aer Lingus is a case in point. The government's objective is to provide a service at a low cost. However, there is a conflict in requiring the airline to implement other secondary policy objectives. Some commentators have even suggested that competition should be reduced to restore profitability to the airline. With Bord Telecom, the threat of competition in some of its markets has resulted in the relaxation of regulation of its monopoly power in its remaining markets.

- Other uncompetitive markets: There are many other markets, even for tradeable goods, which are characterised by monopolistic outcomes because of anti-competitive practices. The work of the Competition Authority and the EC in the area of contracts between undertakings will have some effect in this area, although, being a relatively recent development, it is not clear how credible is the practice of competition policy.

Competition policy in Ireland seems largely confined to the latter area which is undoubtedly important. However, the analysis suggests a broader definition of anti-trust which would include public service monopolies.

The issue of labour hoarding in the protected sector might be an important practical constraint on public policy. If uncompetitive firms are over-staffed, then the immediate effect of competition policy would be to increase unemployment. With hysteresis (for insider-outsider or any other reasons), it is not clear that a corresponding increase in employment in other dependent sectors would occur, especially if entrepreneurship is lacking. Thus competition policy might have an adverse effect on unemployment (perhaps even in the long run). With relation to work practices, competition policy could have an effect measured by increased productivity which could also be argued to improve welfare.¹⁴

4.3 *Peripherality*

It is often argued that the poorer economic performance of regions which are geographically peripheral has to do with transport costs. While high transport costs would increase the level costs in the economy, this may not be the only cause. High transport costs increase the overall level of non-tradedness in the economy and thereby allow for more scope for monopolistic behaviour. More significantly, it might be argued that peripheral regions are more prone to non-competitive behaviour by reason of their size. Fewer economies of scale exist in smaller economies and the level of competition may be reduced (Sutton, 1991). Another possibility is that anti-competitive practices and rent seeking are more easily carried on in smaller economies with lower communication costs. This gets into the area of influence costs, and I am not aware of any research in relation to the Irish economy in this context.

14. Improved productivity might reduce the utility of those working in the area. Would competition policy reduce the supply of poets and writers?

4.4 *Taxation*

The analysis in this paper is relevant to taxation (and, indeed, to micro-economic reforms more generally), but the emphasis was deliberately put on non-traded inputs in order to emphasise the fact that the solution to the unemployment problem does not lie solely within the labour market. The evidence is that the reduction in taxation in the late 1980's increased labour demand in all sectors. The fact that there was only a small improvement in the economy's competitive position (McGettigan, 1992) suggests that reductions in the cost of labour may not have been passed on in the form of lower prices of non-traded inputs. The crucial question is whether the benefit of tax reform is passed on to workers in the form of higher-than-productivity increases in wages or in lower prices of produced commodities (both inputs and outputs). In the Irish context, the bias toward high labour taxes reduces the dependence of the traded sector on labour costs, but possibly increases the dependence on costs in the non-traded sector. This suggests that competition policy could be relatively more effective.

4.5 *Demand Factors*

The model is suitable for examining the role of external factors in explaining Irish unemployment. Various authors¹⁵ note that external demand is one such factor and this may be considered here as an exogenous shift in the demand function.¹⁶ With some labour market rigidity, standard results obtain and the economy contracts after a negative demand shock. The assumption of downward sloping demand for traded goods gives an extra mechanism for demand contraction and overcomes Barry's and Bradley's (1991) objection to Newell's and Symons's assumption of monopolistic competition in the traded sector. This point is further addressed by Browne and McGettigan (1993). The effect of international supply shocks cannot be modeled as all inputs are domestically produced.

V CONCLUSION

This paper has set out a general equilibrium model of an economy with monopolistic features in the non-traded input sector and competition in the traded sector. While the assumptions of the model are very stylised, the

15. For instance, Newell and Symons (1990), Barry and Bradley (1991), and Browne and McGettigan (1993) attempt to assess the role of external, domestic and demographic factors in determining the level of unemployment. The long lags in the reaction of the Irish economy to external factors suggest that the mechanics of adjustment may be slower in the Irish economy.

16. A shift in the demand function could also proxy for a change in the exchange rate. Only the demand side is affected, however, since imported goods are not inputs to the production process in either sector in the model.

results regarding the effectiveness of competition policy appear relatively robust to changes in these assumptions. First, reversing the sectors gives similar results, i.e., if the non-traded sector were perfectly competitive and the traded sector imperfectly competitive. This suggests that it is the categorisation of competitive versus less competitive that is central to the performance of the economy, rather than the distinction between traded and non-traded. The non-traded sector is used because it is typically the sector where entry barriers are more likely to arise. Second, the assumption that demand is downward sloping is not restrictive. An assumption of infinitely elastic demand gives similar results (shown in an appendix). Thus the argument is relevant both for differentiated and homogeneous traded goods. Third, the use of unusually simple production functions does not affect the analysis, it merely makes it more tractable, although some detail is forfeited. Finally, total output is a crude and partial proxy for welfare since it does not take account of increases in labour supply which may affect welfare negatively. A more rigorous analysis of welfare would be desirable but is beyond the scope of this paper. However, for an economy with high unemployment, the labour supply effect on welfare is likely to be low and this point would mitigate major concerns in regard to the measurement of welfare.

The main results may be summarised as follows. Monopolistic competition in one sector prevents the economy from attaining its potential. In this context, competition policy might be beneficial. The effectiveness of competition policy depends on conditions in the labour market. With a perfectly flexible labour market, competition policy increases employment and output and raises the welfare of the economy, with benefits proportional to the level of monopoly profits in the economy at the outset. In this case, the model emphasises the role of markets other than the labour market in increasing employment in an economy.

With inelastic labour supply, competition policy merely increases wages and policies to increase labour force participation are required to increase employment. If insider workers have strong bargaining power over outsider workers and entrepreneurs, competition policy will lead to increased wages and will have no effect on employment or welfare. In this situation, competition policy must be accompanied by measures to promote entrepreneurship or to limit union power. It was argued that this story of the labour market approximated to features of the Irish economy and might be relevant for the current policy debate. Other partial insights relating to the allocation of talent and rent seeking are also of interest and appear worthy of further research. A high level of monopolistic activity could be argued to be the major factor contributing to Ireland's higher level of hysteresis, as identified by Browne and McGettigan.

In summary, therefore,

1. Competition policy can increase employment, output and welfare in an economy with uncompetitive sectors.
2. The effectiveness of competition policy depends on the situation in the labour market. If employment does not increase because of inelastic labour supply or because of union power/lack of entrepreneurship, competition policy will have no effect and wages rise. In the latter case, unemployment results.
3. The solution to Ireland's unemployment problem does not lie exclusively in the labour market. In fact, the role of markets for other inputs may be crucial and deserves further attention. Additionally, research on rent-seeking and entrepreneurship could be relevant.
4. Ultimately, the effectiveness of competition policy is cumulative and is related to the amount of competition policy in the past.¹⁷ Small effects in the short-run, therefore, should not affect our perseverance.

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17. This relates to an argument of Kennedy (1993) regarding social consensus. As more industries are made competitive, the set of "insiders" decreases and the consensus in favour competition policy would increase. Analogously, the need for the government to confront a wide variety of powerful lobbies is greatest in the initial stages.

APPENDIX

Completion of General Equilibrium Model

Households maximise $U(x, l) = x^a l^b$ where x is the quantity consumed and l is leisure. The demand functions are

$$x = \frac{a}{a+b} \frac{\text{Income}}{P}$$

and the labour supply functions are

$$h = 1 - l = 1 - \frac{b}{a+b} \frac{\text{Income}}{w}$$

The variable income depends on whether the individual works in the traded sector (Income = $w + \pi$), or in the non-traded sector (Income = $w + s + \pi$), where π is the individual's share of profit.

The traded sector employs n_L people, so

$$L = n_L h_L = n_L \left(1 - \frac{b}{a+b} \frac{w + \pi}{w} \right)$$

$$Q_L = n_L x_L = n_L \left(\frac{a}{a+b} \frac{w + \pi}{P} \right).$$

Similarly, the non-traded sector employs n_K people, so

$$K = n_K h_K = n_K \left(1 - \frac{b}{a+b} \frac{w + s + \pi}{w + s} \right)$$

$$Q_K = n_K x_K = n_K \left(\frac{a}{a+b} \frac{w + s + \pi}{P} \right).$$

The total demand is

$$Q = Q_L + Q_K = n_L \left(\frac{a}{a+b} \frac{w + \pi}{P} \right) + n_K \left(\frac{a}{a+b} \frac{w + s + \pi}{P} \right).$$

so that the value of the total output of the economy is

$$PQ = \left(\frac{a}{a+b} \right) ((w + \pi)n_L + (w + s + \pi)n_K).$$

The total income of the economy is the wage bill plus the total profit

$$\begin{aligned}
 Y &\equiv wn_L h_L + (w+s)n_K h_K + \pi(n_L + n_K) \\
 &= n_L w \left(1 - \frac{b}{a+b} \frac{w+\pi}{w}\right) + (w+s)n_K \left(1 - \frac{b}{a+b} \frac{w+s+\pi}{w+s}\right) + \pi(n_L + n_K) \\
 &= n_L \left(w - \frac{b}{a+b}(w+\pi)\right) + n_K \left(w+s - \frac{b}{a+b}(w+s+\pi)\right) + \pi(n_L + n_K) \\
 &= n_L \left(w+\pi - \frac{b}{a+b}(w+\pi)\right) + n_K \left(w+s+\pi - \frac{b}{a+b}(w+s+\pi)\right) \\
 Y &= \left(\frac{a}{a+b}\right) ((w+\pi)n_L + (w+s+\pi)n_K) = PQ
 \end{aligned}$$

Model with Infinitely Elastic Demand

The analysis of the model with infinitely elastic demand is unchanged with the exception that P is exogenous. Equation (16) holds, that is

$$P = \frac{\alpha w + w + s}{\alpha \left(1 - \frac{1}{n}\right)}$$

As P is exogenous, this may be expressed as an equation determining the equilibrium wage rate in terms of the exogenous variables,

$$w = \frac{\alpha}{\alpha + 1} \left(\left(1 - \frac{1}{n}\right) P - s \right).$$

Thus the wage level in the economy is an increasing function of the price which traded goods obtain on export markets. Competition policy increases the wage, that is

$$\frac{dw}{dn} = \frac{\alpha}{\alpha + 1} \left(\frac{1}{n^2} \right) P > 0.$$

Thus, as with the case where demand is negatively sloped, competition policy increases labour demand. Whether this increases welfare depends on the marginal utility of leisure, but the income-leisure possibility frontier has shifted out and this would typically correspond to a welfare improvement.