OECD Economic Studies No. 26. 1996/I

MARKET IMPERFECTIONS AND EMPLOYMENT

Paul Geroski. Paul Gregg and John Van Reenen

TABLE OF CONTENTS

Paul Geroski is a Professor at the London Business School. Paul Gregg is a Senior Research Fellow at the Centre for Economic Performance. London School of Economics and John Van Reenen is from University College London and the institute for Fiscal Studies The support of the Economic and Social Research Council and Leverhulme Trust is acknowledged by the third author All errors are those of the authors

INTRODUCTION

Does imperfect competition in product markets contribute substantively to the level and persistence of unemployment in modern industrial economies? Whilst the role of imperfect labour markets, especially the role of trade unions and government interventions (such as welfare systems and employment legislation), has been much discussed in the last decade within the nostrum of supply side economics, the counterpart of rigidities in product markets has been less of a focus. Whilst the popular "NAIRU" framework allows for the possibility that such rigidities could be an important influence on unemployment as firms raise prices above marginal cost, the empirical magnitude of such a mark-up and its variation over time {including over the business cycle) has not been addressed in this framework.

Product market imperfections can influence employment paths through time without shifts in the price/marginal cost mark-up, through rent sharing by firms with workers perhaps at the behest of union negotiated wages. For unions or individuals to raise wages above the competitive level without driving the employer out of business requires rents to be generated. Rents can be generated by organising the whole industry or control of the supply of key labour inputs (including effort). Outside these restricted circumstances wage mark-ups require the presence of surplus rents and there will therefore be a key interaction between product market power and the ability to capture rents in shaping wage levels and changes.

In the first section we set out some simple partial and general equilibrium considerations of the effects of market power on employment. In the second section, the paper documents the available empirical research of the origin and extent of product market power held by firms due to market imperfections. The third section looks at the evidence on the size of price-cost margins. The implications for employment are then explored through transmission of such power into the labour market through wages.

The paper thus assesses the extent of product market imperfections and their importance in wage setting It concludes that product market imperfections are widespread and although large deviations of price above marginal cost appear to be short lived, many firms are able to enjoy persistently high returns for long periods of time The evidence that such surplus rents are shared with workers is mixed. industry wage premia are related to the presence of rents but cannot explain all the

apparent variation in wages above levels predicted by human capital or compensating differentials. What is more such mark-ups are not solely captured by unions. Company/plant level evidence (including event studies) indicates that unions capture some rents hence reductions in union influence may reduce but would not eliminate wage premia. The macroeconomic implications of the existence and capture of surplus rents are difficult to assess given the little empirical analysis at the aggregate level. Yet the implication is that reductions in product market imperfections would reduce rent capture and raise employment.

MARKET POWER AND EMPLOYMENT

In this section we outline some simple theoretical notions on the relationship between market power and employment. First we will consider some partial equilibrium analysis and then move on to some general equilibrium considerations.

Partial Equilibrium

Product market power will generally lower the rate of employment due to the fact that firms will price above marginal cost, restricting output in order to achieve higher profits. There are many models of imperfect competition, but positive mark-ups are a necessary feature of all of them. To fix ideas consider a homogenous goods industry with iso-elastic demand:

$$\log Q = -\eta \log(P/P^*)$$

Where Q is output, P is industry price (relative to an aggregate price index P*) and η is the price elasticity of product demand The monopolist sets marginal revenue equal to marginal cost enabling her to set prices at a mark-up over marginal costs to an extent which depends on the elasticity of product demand:

$$\log(P/P^*) = \log(c) - \log(1 - 1/\eta)$$

where c is marginal cost. Denote employment by N, a simple Cobb-Douglas production function is:

$$Q = N^{\alpha}$$

then the demand for labour can be written as·

$$\log(N) = (\eta/\alpha)\log(1 - 1/\eta) - (\eta/\alpha)\log(c)$$

Notice that competition is here represented by the elasticity of demand. For $\eta > 1$, an increase in the elasticity of demand will always increase employment. As the elasticity decreases, the firm has more power to raise prices over marginal costs. Optimal output and therefore employment will be lower and prices will be higher. If we were to consider a model of monopolistic competition then the elasticity of demand would be due to consumers preferences for variety. Under a model of symmetric quantity setting oligopolists playing as Cournot competitors we would

get an extra term representing each firm's market share. It is a robust feature of all these models that greater monopoly power in the industry will reduce output and therefore tend to decrease employment.

Now consider what happens when some of the product market rents are the object of bargaining. Under a model where firms and unions bargain over the wage but the employer sets employment the outcome will still be consistent with the above "employment equation". However, the higher wages that will result from the bargain will raise marginal costs and therefore reduce employment. Thus in this kind of model employment is lower due to imperfections in both the product market **and** the labour market.

An alternative to the union bargaining model described above is one where unions and managers bargain over both wages and employment. This is sometimes known as "efficient bargaining" as it is privately efficient for both parties to contract in this way. It is no longer so clear, in this model, that increases in union power will reduce employment – much depends on the objectives pursued by the trade union. When unions simply seek to maximise the wealth of their members then the efficient contract will be one where employment is unchanged by an increase in union power (up to the point where the firm exits the market). The wage rate simply acts to "split the surplus" between union members and shareholders. Unfortunately, as discussed in more detail below, there is no consensus upon the appropriate form of union bargaining model (see Pencavel, 1991, for an overview).

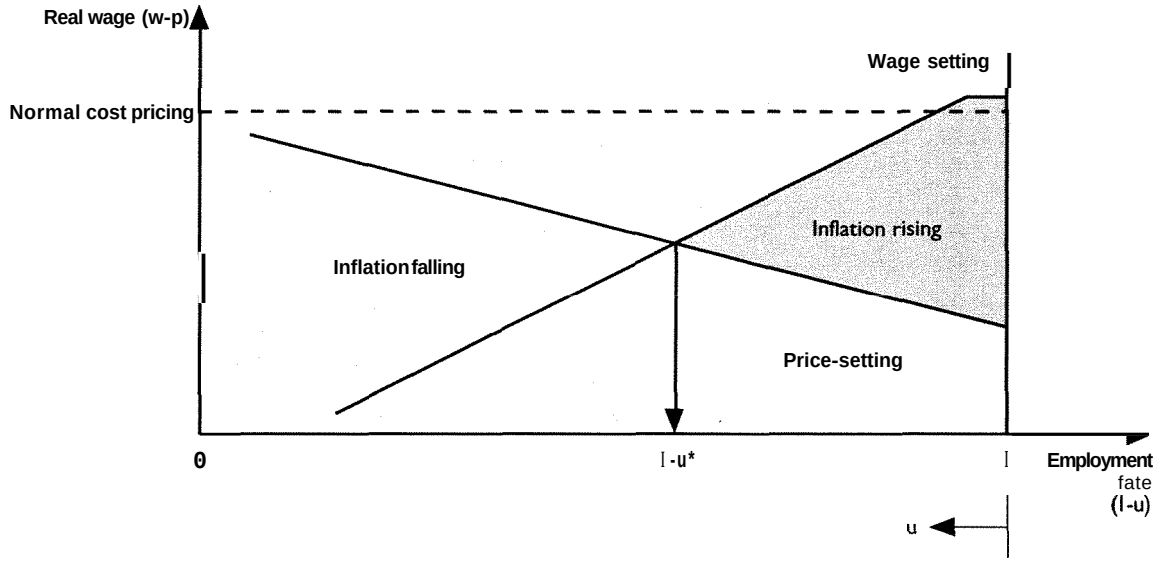
The empirical implications of models which contain both imperfections in the labour and in the product market are profound. For example, ignoring the importance of rent-sharing in the labour market will cause the anti-trust authorities to underestimate the degree of monopoly power in the economy. Consider the practice of correlating the profitability of an industry against a measure of industrial concentration. When workers extract rents profits will be lower. If this rent-sharing behaviour is positively correlated with concentration (as it is likely to be) then the degree to which concentrated industries earn higher profits will be underestimated. Thus the potential welfare losses due to market imperfections will also be underestimated.

General equilibrium and macro implications of monopolistic power

The presence of market power analysis at the micro level will be evaluated in the rest of the paper. There have been some empirical studies identifying market power at the aggregate level (e.g. Bils, 1987 and Hall, 1988, 1990). The inclusion of product market imperfections in macroeconomic models analysing the determinants of unemployment is rare. One exception to this is Layard and Nickell (1986). In this model firms set prices as a mark-up over (expected) wage costs and workers bargain wages as a mark-up on prices. In the absence of market power prices are set

with a zero mark-up on marginal cost (normal cost pricing), the hatched line in Figure 1. However, with market imperfections a mark-up will exist and may rise in an economic upswing (when unemployment is lower), producing the downward sloping price setting line in real wage and employment space. The extent to which imperfect competition may reduce employment over time or between countries has not been estimated in models of this form but the cyclical variation produces important dynamics. This model retains a common feature with competitive models, namely a single well defined equilibrium. Manning (1990), however, extends the model so that firms face increasing returns to scale. This relatively minor alteration produces a non-linear price setting schedule that generates two equilibria (*i.e.* the price setting schedule intersects that for wage setting at two separate points with high and low levels of unemployment). The key feature of his model is that depending on the degree of sluggishness of adjustment of wages and prices – either or both equilibria can be locally stable and an economy could move between them. Hart (1982) and Silvestre (1993) amongst others offer a more comprehensive theoretical structure than Manning (1990), describing the implications of imperfect competition for general equilibria. Unemployment in these models is an inefficiency derived from an absence of co-operation or co-ordination by economic agents and unemployment persists without any union bargaining or labour market influence by

Figure 1. ***Wage and price setting in the Layard and Nickell NAIRU Model***



Source: Adapted from Layard, Nickell and Jackman, 1992.

employees. The persistence of unemployment derives from the possibility of a number of locally stable equilibria rather than the unique Pareto optimal Walrasian equilibrium of perfect competition. This could imply a number of "Natural Rates" around which economies will cycle and potentially shift between if a shock of sufficient magnitude occurs. The translation of product market power into unemployment in these models requires that a competitive sector capable of absorbing those not employed in the non-competitive sector, either does not exist or is incapable of doing *so* at wages above subsistence levels (or available benefits). In these circumstances product market power can generate unemployment without labour market wage rigidities. The emphasis such models place on co-operation and co-ordination, with or without wage setting power of unions, has led to arguments for the institutions that induce co-operation/co-ordination in wage setting, such as Calmfors and Driffel (1987), Soskice (1990) or Bean (1993).

THE SOURCES OF MARKET POWER

Introduction

Quick and costless entry into and exit from markets by firms is the benchmark now commonly used to detect the existence of market power. This state is known as "perfect contestability". If entry and exit are quick and costless any attempt by incumbents to raise price above costs will be thwarted by "hit and run" entry (see Baumol *et al.*, 1982). Entry and exit will be quick and costless when there are no costs of adjustment penalising over-rapid expansion, no fundamental asyrnmetries between entrant and incumbent in costs or demand, and no sunk costs that would impede exit. In short, for a market to be contestable, there must be no barriers to entry or exit.

Identifying barriers to entry

Barriers to entry are conventionally defined as "...the advantages of established sellers in an industry over potential entrants, these advantages being reflected in the extent to which established sellers can persistently raise their prices above a competitive level without attracting new firms to enter the industry" (Bain, 1956, p 3). The focus on the ability of incumbent firms to persistently raise prices means that entry barriers are likely to be durable features of a market, or the result of long-term strategic investments made by incumbent firms. Needless to say, the existence of substantial barriers means that incumbents are, in principle, able to earn persistently high profits even in the long run

There are three main sources of entry barriers: product differentiation advantages, absolute cost advantages, and scale related advantages. We consider each in turn (see Geroski, 1993 for a fuller discussion).

Product differentiation advantages

Product differentiation advantages arise from "...buyers preferences for one of some variety of very similar substitute products ...and aiso to the fact that different buyers have different allegiances or preference patterns, so that the preferences in question do not result in some universally agreed upon system of grading or rating of competing products" (Bain, 1956, p 114). The consequence is that entrants will be forced to charge lower prices to sell the same quantity as incumbents, or will sell less at the same price

One type of product differentiation barrier is created when consumers must learn about the characteristics of a good in order to use it properly Investments in information gathering are sunk costs from the point of view of consumers, and once a consumer has invested in one particular brand, that person is likely to have little interest in experimenting with other brands that arrive later on the market (Schmalensee, 1982) This, of course, means that follower brands are likely to sell less than pioneers for the same level of prices. Doctors, for example, often digest enormous quantities of technical information before they are willing to prescribe a new drug to their patients Having made an investment in one drug that works satisfactorily, they are normally unwilling to do the same for similar drugs that arrive later on the market. As a consequence, "first movers" often enjoy long-lived advantages over later arriving competitors (see for example Grabowski and Vernon, 1982 and Gorecki, 1986). Much the same applies in other markets. Urban *et al.* (1984) examined 129 frequently purchased consumer goods, and discovered that the second arriving brand enjoyed a market share 75 per cent as large as the first mover. To achieve a share as large as the pioneer, the average second mover in their sample would have had to have done nearly 3 5 times as much advertising.

Product differentiation barriers can also be created by network externalities which exist whenever the value of a good to consumers depends upon how many other consumers use the good When two different, incompatible goods which enjoy network externalities are offered to consumers, the one with the larger network will always be preferred. Hence, an early moving pioneer who can quickly build up a large customer base will often be safe from entry In the case of video cassettes, for example, network externalities arise from the fact that a large number of users of a particular type of video (VHF or Betamax) living in a given area will support a much larger and more varied library of videos in video rental shops than the same number of users split between two or more different standards will (Grindley and McBryde, 1989). Similarly, control over the provision of some complementary goods can frequently give a firm market power by "locking in" consumers In particular, consumers who have bought complementary goods that are not compatible with versions of the primary good offered by rivals are effectively restricted from buying their product Classic examples of this lock-in include the mainframe computer industry (Brock, 1975).

Advertising can affect entry through the effect that it has on the choices that consumers make (see, *inter alia*, Schmalensee, 1972; Cowling *et al.*, 1975; Comanor and Wilson, 1979; Scherer and Ross, 1990). Advertising is pro-competitive because entrants can use it to make consumers aware of their products. However, advertising creates market power when it reinforces the market position of incumbents, or when entrants are forced to incur large fixed costs in matching the advertising expenditure of incumbents. Rizzo and Zeckhauser (1990), for example, found that although less well known physicians advertised more heavily than more established ones, the returns to advertising were rather higher for more established physicians and, consequently, that advertising was anti-competitive on balance. Similarly, Geroski and Murfin (1990) found that entrants into the UK car industry were able to advertise extensively and establish a place for themselves in the market. However, as more and more entrants appeared in the late 1960s and early 1970s, incumbents responded to the advertising of entrants by increasing their own advertising. As a consequence, the total volume of industry advertising rose precipitously, which made it more and more costly to acquire an advertising share of any given size. These rising fixed costs eventually choked off entry.

Absolute cost advantages

Absolute cost advantages arise when the unit costs of incumbent firms lie everywhere below those of entrants, opening up a gap that enables incumbents to raise prices above their own costs without attracting entry: "For a given product, potential entrant firms should be able to secure just as low a minimal average cost of production after entry as established firms had prior to entry. This, in turn, implies a) that established firms should have no price or other advantages over entrants in purchasing or securing any productive factor (including investible funds); *b)* that the entry of an added firm should have no perceptible effect on the going level of any factor price; and c) that established firms have no preferred access to productive techniques" (Bain, 1956, p. 12).

The most common types of absolute cost advantage are created by monopoly control over various scarce inputs or natural resources However, control over the infrastructure supporting the production and sales of a particular product can also create cost advantages for incumbents. For example, express coaching in the UK was deregulated in 1980, but National Express, one of the two original public sector companies, has retained its dominant position. This occurred in the face of several entry attempts because National Express was able to block access by entrants to coaching terminals (Davis, 1984)

Patents are a source of absolute cost advantages because they restrict the access of entrants to up-to-date, state of the art technology, but their effectiveness depends on how difficult imitation is Mansfield *et al.* (1981) examined a sample of

48 product innovations and discovered that the imitation costs and times were roughly two-thirds the costs of the original innovation, and that 60 per cent of patented innovations were imitated within four years. Patents in drugs were, however, particularly effective at deterring imitators (see Levin *et al.*, 1987 on conditions of appropriability). More generally, legal restrictions on entry and a whole range of government policies can also create absolute cost advantages for favoured firms. Tariff and non-tariff barriers to trade are examples of such barriers, as are the subsidies doled out to "national champions" suffering from a surfeit of foreign competition *(e.g.* see OECD, 1985 and, for a survey of barriers which fragment the internal EEC market, see EEC, 1988). Procurement policies by national governments are also often used to support certain firms against their rivals.

Absolute cost barriers often affect entry conditions because they delay the arrival of entrants, giving incumbents time to invest in learning by accumulating experience in production or sales. For example, Lieberman (1984) uncovered strong learning effects in the chemicals processing industry, with costs of production falling appreciably with increases in cumulative output or investment. Learning, however, only brings advantages to firms who can prevent rivals from benefiting from their experience, and firms often have to invest heavily in RGD in order to take advantage of learning curve effects.

Economies of scale

Economies of scale create entry barriers for two reasons First, whenever economies of scale make large plants efficient relative to small ones, the need to raise finance to construct such plants may create problems for entrants when capital markets are not perfect. Second, economies of scale can be used by incumbents to squeeze entrants margins On the one hand, if entrants enter at the minimum efficient scale and produce as cost effectively as incumbents, they will produce a large volume of output and depress market price. On the other hand, if they choose to operate at a small and inefficient scale in order to keep prices from falling, they will suffer a cost penalty Either way, they are not able to enjoy the same margin between price and costs post-entry that incumbents enjoyed pre-entry. Indeed, if economies of scale are large enough, if incumbents respond aggressively to entry and if the market does not expand much, then prices may fall below entrants' expected post-entry costs and entry will be blocked

There has been a wide range of studies of economies of scale, and they suggest that the advantages of scale economies in production are fairly modest (see Scherer and Ross, 1990) Of more importance in many industries is the fact that entrants often need to sink substantial fixed costs in order to enter a market Many of these are associated with advertising and RGD. More generally, Biggadike (1976) studied a small sample of advantaged entrants (subsidiaries of large firms well established in

other markets) in a number of US industries, and discovered that they might need as much as 8 years to break even, and 10-12 years to earn returns comparable to those enjoyed by incumbents. The primary cause of this was the extremely high levels of marketing and R&D expenditures needed to effect entry, these being 41 per cent and 51 per cent of revenue on average in his sample.

Scale economies can often have an effect on entry in markets where competition is "localised" due to product differentiation barriers (Eaton and Lipsey, 1978). The localisation of competition restricts the market open to an entrant who chooses to produce a particular product in a particular location in geographic or product characteristics space Since scale economies mean that the entrant must capture a large share of that local market if it is to be viable, entry is correspondingly more difficult. However, in markets where consumers tastes are diverse and change rapidly, entrants can overcome the disadvantages of scale by adopting flexible production techniques Effectively, this requires trading off the ability to produce one product very efficiently at a large output rate against the ability to produce a range of products at rather smaller output rates (Carlsson, 1989).

The strategic exploitation of entry barriers

Entry barriers are created by factors which cause differences in the costs and demand of entrants and incumbents, and can be exacerbated by the strategic actions of incumbents Decisions to create or exploit have the character of investment decisions, with costs incurred pre-entry and benefits realised in the future if entry is impeded. Strategic entry deterrence is more likely to be undertaken by far sighted incumbents in markets which are profitable, stable and predictable, or in markets which are dominated by one or a few giant firms.

One strategy open to incumbents is to issue a credible pre-entry signal which persuades potential entrants that the incumbent plans to produce a large output post-entry, depressing prices below average costs. Some economists believe that a low pre-entry "limit" price will do the trick (Modgliani, 1958 and, for a more recent version of this argument, see Milgrom and Roberts, 1982), but most now accept that something much more substantial and irreversible is needed (see the discussion in Geroski *et al.*, 1990 and Tirole, 1988). Irreversibility matters because threats made pre-entry which can be undone post-entry lack the credibility needed to deter entrants. In fact, what the incumbent would like to do is to produce at monopoly levels pre-entry while threatening to produce more output post-entry should the entrant begin its assault on the market. One way to implement this strategy is to install sufficient capacity pre-entry to wipe the entrant out post-entry, but then to leave it under utilised unless entry actually occurs {Spence, 1977 and Dixit, 1980).

incumbents can also try to limit the demand facing an entrant by restricting its potential market. Many markets are segmented. some consumers live in different

geographical areas and must incur substantial transportation costs to visit other areas, and some consumers have well defined and strongly held preferences for particular product attributes. Faced with this segmentation, an entrant will need to locate in a market niche that is large enough to enable it to earn positive post-entry profits if it is to survive, and incumbents can block entry by filling the available product and geographical space with their own products, leaving no room for the entrant. The higher are fixed costs, the larger the market that the entrant will need to reach in order to break even, and, therefore, the less densely packed the available product and geographical space needs to be to deter entry. This can be accomplished pre-entry by excessive product proliferation (for an example, see the discussion of the ready-to-eat breakfast cereal market in Schmalensee, 1978), or post-entry by the use of "fighting brands" (new products introduced by incumbents that exactly match those introduced by entrants) which distract attention away from entrants' products

Finally, incumbents can pursue strategies that raise entrants' costs (either fixed or marginal costs), effectively forcing entrants to sell a larger output in order to break even Such strategies often raise incumbents' costs as well, but as long as they raise rivals' costs more than they raise incumbents' costs, they will be attractive to incumbents (Salop and Scheffman, 1983). For example, computer reservation systems are extensively used by travel agents to book airline flights. They are owned by a few airlines, and are often offered to travel agents at or below costs. Rival airlines' costs are raised by this tactic because the system can be used to shift bookings towards the proprietor airline, forcing rival airlines to incur substantially increased marketing expenditures in an effort to attract new customers and retain the loyalty of older ones (Fisher, 1987)

The effects of entry on prices and profit margins

In the absence of entry barriers, entry will occur whenever prices exceed competitive levels As entrants attempt to undercut incumbents in order to penetrate into the market and as incumbents respond in an effort to defend their market positions, prices are likely to fall. Entry, even if it does not occur, can also effect prices if the anticipation of potential entry by incumbents leads them to cut prices (in order to deter entrants) This outcome is particularly likely to occur when **fixed** costs are not sunk (so that exit is costless), and when product differentiation and absolute cost advantages do not exist (so that entry is easy) These effects are likely to be observable in systematic movements in profits over-time. In particular, the effects of entry are likely to induce a simple autocorrelation in profits over time: high profits today induce entry, which reduces profits tomorrow

There have been a number of estimates of such "persistence of profits" equations, and they generally suggest that profits converge to long-run equilibrium

levels fairly quickly, but that long-run profits are not driven to zero (see Mueller, 1986 and, for an international comparative study, Mueller, 1990). Firms with large market shares and in advertising-intensive industries show noticeably higher long-run profits than others. Using a structural model of profit dynamics and entry, Geroski (1989*a*) found that profits converged fairly rapidly towards their long-run levels, which averaged $\pi^* = 15$-20 per cent. Actual and potential entry each seemed to have a (fairly) weak effect on the dynamics of margins (see also Bresnahan and Reiss, 1988), and the effects attributable to each seemed to be roughly of the same order of magnitude. Industries that were highly concentrated and in which advertising was particularly heavy showed both slower adjustment to and higher levels of long-run profits (see Geroski, 1993 for a fuller survey of this work).

Table 1 shows estimates of projected long-run profits, π^*, for a number of broadly comparable industries in six countries. Pharmaceuticals stands out as a high profits sector in all countries (particularly in France, Japan and the United State). Electrical equipment also displays above average profits in all six countries, as do cement, stone and glass in four out of the six. Shipbuilding, on the other hand, is a consistently low profit sector, as (less clearly) are iron and steel, rubber and paper and pulp. In general, the pattern of projected long-run profits across

Table 1. **Estimated long run profits by industry for six OECD countries**

	Canada	Germany	France	Japan	United Kingdom	United States
Food	1 63	0 23	0 06	-O 93	0 439	-0 01
Textiles	-2 43	- 044	-2 18	- 0874	0 328	-0 94
Paper and pulp	1.61	-2 165	- 008	- 0007	- 1 03	0 17
Chemicals	-	-	1 56	0 13	-0 21	-0 46
Pharmaceuticals	167	0 516	12 52	1.47	0 14	4 55
Petroleum	1.45	-0 71	5 04	-O 44	-O 20	0 77
Rubber products	0 43	-0 13	-2 70	0 27	-3 13	- 1 77
Cement glass etc	- 1 14	0 03	2 44	0 37	1.52	- 1 48
Iron and steel	1 03	- 045	- 082	040	-	- 1 72
Nonferrous metal	3 41	- 080	- 1 41	0 41	0.86	-O 25
Metal products	3 53	-0 13	0 49	- 1 10	4 058	- 1 10
Machinery and tools	- 1 08	0 18	0 25	-0 39	0 69	0 51
Electrical	1.31	0 37	0 05	0 01	2 53	2 12
Shipbuilding	-	-0.69	- 295	- 026	-4 86	-2 51
Cars, etc	0 81	1.34	-0 13	0 07	1 37	- 1 63
Precision instruments	-	1 13	- 073	1.13	-	0 17

Note Prohts are dehned as after tax prohts plus interest divided by total assets and are normalised by subtracting real prohts in each country

Source Adapted from Odagiri and Yamawaki (1990)

industries is fairly similar in Germany, France, the United Kingdom and the United States; Canada and Japan display somewhat different patterns.

The finding that entry has rather weak effects on profits means that entry barriers are likely to be rather high, most entrants being simply not innovative enough to make a major impact on their host markets. However, there are at least three caveats to this conclusion First, the use of accounting profits in this work raises a number of well known concerns. However, although accounting and economic rates of return can diverge spectacularly, persistently high accounting rates of return imply persistently high economic rates of return, and this is what we observe in the data. Second, the effects of entry may be particularly slow to come, but very powerful when they finally arrive Most of the studies that we have examined are designed to measure the short-run effects of entry on profits, and it may be that using these short time series exaggerates the height of barriers to entry. Third and finally, entry may have a big impact on prices but very little impact on margins if it causes incumbents to reduce costs in line with prices. There is much evidence to suggest that one of the principal responses of incumbents to major waves of entry is savage cost cutting, and this almost certainly means that entry has a bigger effect on prices than it has on profit margins. The implication is therefore that incumbent firms in these situations have excess costs which can be reduced. This may be due to management slack or inertia but may also reflect rent sharing with the workforce which is reduced when rents are eroded (this will be developed later in the section "Wage determination as a form of rent sharing").

Empirical studies of the determinants entry rates or entry penetration often model entry as depending on expected post-entry profits and various types of entry barriers Estimating these equations enables one to generate estimates of the size and primary determinants of "limit profits"; *i.e* the level of profits sustainable by incumbents in the face of entry. Needless to say, estimates of the level of limit profits provide a good measure of the height of entry barriers. Studies have now been reported for a wide range of countries, using data from as early as the 1950s. Broadly speaking, they suggest that limit profits rise with industry advertising intensity, capital intensity and minimum efficient scale (frequently measured by the median plant size of the industry), and falls with industry size and (less clearly) industry growth (see Geroski, 1993 and the international comparisons study in Geroski and Schwalbach, 1991). This pattern of results is widely interpreted as suggesting that advertising and capital raising requirements are important barriers to entry, and that scale economies inhibit entry in small, shrinking markets Industry concentration levels are frequently included in these regressions, but display mixed and often rather imprecisely estimated effects on entry This is slightly surprising. It is generally argued that firms in highly concentrated markets are more likely to overcome the free rider problem associated with deterring entry (which is that only one firm needs do it, but all will benefit) and, therefore, most scholars expect to

Table 2 **Barriers to entry across industries by country**

Canada	Norway	west Germany	United Kingdom
Highest barriers to entry	**Highest barriers to entry**	**Lowest barriers to entry**	**Highest barriers to entry – domestic**
Smelting and refining	Fertilizers	Stone, etc	Cement, etc
Aircraft and parts	Primary aluminium	Ceramics	Stone etc
Breweries	Tobacco	Paper and board	Distilling
Petroleum rehning	Cocoa chocolate, etc	Tobacco	Starch
Toilet prep	Petroleum refining	Cement etc	Food machinery
Cement manufacturing	Sulphates	Fruit and vegetables	Clay products
Iron and steel mills	Vegetable oils	Sugar	Pharmaceuticals
Distilleries	Iron and steel	Soft drinks	Stone working
Cotton and woollen mills	Cement and lime	Other foods	Office machinery
Tobacco products	Spirits and wine	Asbestos products	Wines, etc
Battery manufacturing			
Pharmaceuticals			
Motor vehicle and parts			
	Lowest barriers to entry		**Lowest barriers to entry – foreign**
Clay products	Made-up textiles		Stone, etc
Major appliances	Metal products		Food machinery
Pulp and paper mills	Outer garments		Other manufacturing
Agricultural implements	Leather products		Cement, etc
Rubber products	Boat building		Pharmaceuticals
Soap and clan products	Building materials		Clay products
Synthetic textiles	Sawing/planing wood		Stone working
Meat products	Other foods		Textile machinery
Wineries	Fibre boards		Meat processing
Small appliances printing, etc			

Source Canada Orr (1974) west Germany Schwalbach (1991) Norway van der Fehr (1991) United Kingdom Geroski (1991)

Table 3. **The distribution of entry across industries**

Two-digit US SIC sectors	Belgium			Canada			west Germany			Korea		
	ER	EMS	ERS	ER	EMS	ERS	ER	EMS	ERS	ER	EMS	ERS
Food processing	0051	0021	0 748	0 308	0.214	0 676	0069	0050	0 943	0072	0025	0370
Tobacco	0025	0017	0 660	0 606	–	–	0 051	–	–	–	–	–
Textiles	0041	0018	0 420	0 338	0.265	0 791	0058	0045	0 729	0 107	0028	0 240
Apparel	0058	0026	0 444	0 265	0.270	0 903	0189	0118	0 791	0 153	0049	0 290
Lumber	0045	0019	0 497	0 435	0.362	1082	0 119	0075	0 494	0 116	0042	0490
Furniture	0056	0021	0 506	0 364	0.304	0 753	0143	0 119	0 713	0 154	0068	0400
Paper	0033	0014	0 359	0 371	0.236	0 684	0085	0049	0 395	0 100	0047	0420
Mining	0078	0019	0 246	0 274	0.295	1 180	0 179	0075	0 291	0052	0020	0 100
Chemicals	0041	0015	0 327	0 359	0.238	0 689	0 122	0060	0 494	0 101	0035	0320
Petroleum and coal	0 007	0 001	0 165	0 437	–	–	0 133	0003	0014	0065	0022	0320
Rubber and plastics	0057	0016	0 270	0 514	0.264	0 414	0 185	0075	0 327	0090	0018	0 160
Leather	0027	0009	0 310	0 273	0.250	0 983	0074	0072	0 769	0047	0042	0 200
Stone, clay, glass	0049	0016	0 308	0 317	0.294	0 804	0091	0085	0 824	0092	0052	0610
Primary metals	0031	0004	0 107	0 396	0.139	0 442	0 116	0054	0 491	0 117	0037	0290
Fabricated metal	0059	0021	0 358	0417	0.357	0 802	0112	0 102	0 725	0 126	0063	0440
Electrical machinery	0039	0009	0 281	0 634	0.320	0 481	0 111	0068	0 535	0098	0049	0470
Electric machinery	0076	0013	0 174	0 443	0.245	0 379	0 174	0068	0 262	0 117	0037	0290
Transportation equipment	0093	0034	0 175	0 359	0.238	0 689	0 123	0076	0 348	0073	0038	0 380
Instruments	0092	0061	1601				0 105	0076	0 669	0097	0020	0 160
Miscellaneous	0086	0032	0 436	0 274	0 303	2 394	0 100	0048	0 436	0 139	0053	0 370

Table 3. **The distribution of entry across industries** *(cont.)*

Two-digit US SIC sectors	Norway			Portugal			United Kingdom			United States		
	ER	EMS	ERS	ER	EMS	ERS	ER	EMS	ERS	ER	EMS	ERS
Food processing	0 052	0 006	0 117	0 470	0 280	0 440	0 054	0021	0 274	0239	0 148	0 313
Tobacco	0 000	0 000	0 000	0 000	0 000	–				0 205	0026	0 107
Textiles	0 076	0 007	0 085	0 420	0 180	0 300	0 084	0 029	0 364	0 372	0 244	0 374
Apparel	0 107	0 016	0 145	0 630	0 470	0 510	0 074	0 047	0 687	0403	0370	0 512
Lumber	0 075	0011	0 139	0 440	0 270	0 470	0 068	0 060	0 999	0497	0419	0 424
Furniture	0 065	0 009	0 087	0 530	0 330	0 440				0471	0367	0 383
Paper	0 037	0 003	0 076	0 390	0 150	0 280	0 069	0 030	0 657	0314	0 159	0 304
Mining	0 091	0 014	0 147	0 360	0 190	0410				0490	0329	0 407
Chemicals	0 071	0 001	0 082	0 460	0 140	0 200	0 074	0 024	0 335	0325	0 132	0 217
Petroleum and coal	0 060	0 000	0 003	0 660	0 200	0 130	0 035	0 001	0015	0337	0230	0 354
Rubber and plastics	0 072	0 013	0 191	0 500	0 330	0 510	–	–	–	0431	0 189	0 224
Leather	0 054	0 006	0 140	0 480	0 210	0 280	0 057	0 051	1 076	0294	0252	0 476
Stone, clay, glass	0 067	0 010	0 142	0 430	0 180	0 290	0 063	0 028	0 472	0 344	0 183	0 330
Primary metals	0 031	0 001	0015	0 500	0 140	0 160	0 089	0014	0 209	0319	0 182	0 329
Fabricated metal	0 099	0 026	0 260	0 520	0 220	0 260	0 049	0 035	0 733	0429	0310	0 376
Electrical machinery	0 119	0 041	0 379	0 530	0 200	0 230	0 084	0 103	0 505	0465	0523	0 299
Electric machinery	0 111	0 009	0 070	0 530	0 270	0 330	0 096	0 022	0 193	0461	0213	0 216
Transportation equipment	0 082	0 009	0 100	0 370	0 130	0 250	0 052	0 019	0 250	0465	0276	0 257
Instruments	0 095	0 035	0 469	1230	0 230	–0 060	0 078	0 043	0 649	0603	0368	0 224
Miscellaneous	0 135	0 020	0 127	0 390	0 230	0 460	0 075	0 036	0 544	0402	0.271	0 351

Note ER is the entry rate (gross number of entrants divided by the current population of firms) ES is the total sales of entrants divided by total industry sales and ERS is the size of entrants relative to incumbants (ERS = ES/ER) The dating and periodicity of the table are Belgium – mean across the years 1980-84 Canada – mean across the period 1971-79 west Germany – mean across the period 1983-85 Korea – mean across two periods 1976-78 and 1979-81 Norway – mean across the years 1980-85 Portugal – mean across the period 1983-86 United Kingdom – mean across the years 1974-79 and the United States – mean across the four Census periods 1963-82

Source Schwalbach (1991)

uncover a negative correlation between concentration and entry It is now widely recognised that fixed costs must be sunk if they are to deter entry credibly, and some progress has been made in adjusting estimates of the stock of assets such as machinery, building and advertising goodwill for depreciation and for their resale value (see Kessides, 1986 and 1989; Mata, 1991; and Sutton, 1991). These sunk cost proxies "work" in the sense of being correlated with entry rates, but it is not evident that they much affect the pattern of correlations of overall fit achieved by these models of entry.

Table 2 shows lists of industries identified as having high or low barriers to entry in the UK, Norway, West Germany and Canada. The ranking of entry barriers by the type of entrant in the UK appear to be similar, and the close comparison to the ranking for Norway should be noted. Canada and West Germany, however, seem to generate somewhat different rankings. It is hard to conclude from this that entry barriers are similar across countries, although some sectors do display consistently high barriers One should also be aware that there may have been some changes in entry barriers over time. For example, the effects of NAFTA will have changed the structure of many industries in Canada since the Orr (1974) study. Table 3 shows some raw data on entry rates in eight countries and leads to the same conclusion. It follows, then that the importance of entry barriers is likely to be market and less clearly country specific. This is broadly consistent with the evidence on long-run profits in Table 1.

THE EFFECTS OF PRODUCT MARKET POWER: PRICE-COST MARGINS

As discussed above, there is also a direct impact of product market power on employment (not only via wages) arising from output reduction through pricing above marginal cost. This section starts by giving a brief overview of the microeconomic evidence in this area.

Output restriction from price above marginal cost

Monopoly prices are created by artificially induced scarcities, and, if barriers to entry protect monopolists, then output restrictions are likely to translate into a reduced demand for labour Traditionally, empirical work on this subject focused on the relationship between market concentration and profits, the former being a proxy for market power and the latter a measure of supernormal profits (for a survey, see Schmalensee, 1989) However, recent work on this subject has used more sophisticated techniques to make more precise inferences about the degree to which firms restrict output (for surveys, see Bresnahan, 1989 and Ceroski, 1988).

The most natural way to test whether firms are restricting output is to compare prices with marginal costs. Since the latter are not observable, it is usually necessary to estimate a marginal cost function and then to detect significant differences

between it and prices at observed outputs. More generally, one might jointly estimate the parameters of a production or cost function and a marginal revenue curve, and then test to see whether the latter is horizontal. There are several ways to do this, but most work has involved estimating conjectural variations {the apparent response of firm i to change in j's output), estimating residual demand curves *(i.e.* the relationship between firms' price and quantity after the supply responses of all rivals have been accounted for), or looking at equilibrium responses to shocks (such as tax changes) Testing for price-taking behaviour is far more complex when industry output is not homogeneous, but the principle is the same {e.g. Bresnahan, 1981)

These exercises make strong assumptions about functional forms for costs and demand, and Hall (1988) has suggested a much more robust approach When the capital stock is fixed and no technical progress occurs, the rate of growth of industry output will be proportional to the rate of growth of labour inputs. If price equals marginal cost, this factor of proportionality equals labour's observed share in revenue (but not of costs), while if price exceeds marginal cost, then the factor of proportionality will exceed labour's observed revenue share, and is marked-up by the ratio of price to marginal cost. With capital stock adjustment, the crucial relationship is between rates of change of output-capital and labour-capital ratios, and technical progress adds a constant to the equation All these relationships hold regardless of the details of demand and cost functions, and are defined in terms of variables generally observable across as well as within industries. Hence, very simple regressions provide estimates to use for testing the equality between price and marginal cost, and, unlike cost or demand function based methods, such tests can be made on inter-industry as well as on intra-industry data

Virtually all the studies of this type which have been reported have rejected price taking behaviour; *ie.* have detected clear signs of output restriction Appelbaum (1979) rejected price taking for the US Petroleum and Natural Gas industry during the period 1947-78, as did likewise Summer (1981) and Ashenfelter and Sullivan (1987) for US Cigarettes, Iwata (1974) for the Japanese Flat Glass industry, Cubbin (1975) for UK Cars, Baker and Bresnahan (1985) for two of three leading firms in the US Beer industry, Slade (1987) for the local Vancouver Gasoline market in 1983, and Appelbaum (1982) for the US Electrical Machinery and Tobacco industries, 1947-1971 The existence of dominant firm pricing leading to prices above marginal costs has been found in the Oil market *(e.g.* Griffen, 1985), Tomato Production in the US (Justand Chern, 1980) and the US Coffee Roasting industry (Gollop and Roberts, 1979 and Roberts, 1984). Borooah and Van Der Ploeg (1986) discovered relatively high degrees of monopoly power in 10 two-digit UK industries, 1954-79, and Hall (1988) failed to reject price-taking behaviour in only four of 21 two-digit US industries, finding a price-marginal cost gap of 30 per cent on average in US manufacturing. Finally, work on the Joint Executive Committee, a

cartel controlling freight shipments from the east coast of the US at the end of the last century, suggests a systematic pattern of alternating co-operative and non co-operative pricing phases, with the latter often occurring after entry but not necessarily in periods of low demand (*e.g.* Lee and Porter, 1984; Porter, 1983, 1985). Similarly, work on the Uruguayan Banking sector observed major changes in behaviour following the relaxation of legal restrictions on entry (*e.g.* Spiller and Favaro, 1984 and Gelfand and Spiller, 1987)

Event studies

It seems that the productivity gains after privatisation or deregulation have come predominantly from labour shedding rather than output increases/price decreases even where wage reduction has occurred (Haskel and Szymanski, 1992; Domberger *et* al., 1986) There is also considerable doubt whether substantial wage reductions occur in the absence of a marked increase in the level of competition in the product market. There is evidence to suggest that one of the principal responses of incumbents to major waves of entry or other increases in competitive pressures is savage cost cutting. The implication is therefore that incumbent firms in these situations have excess costs which can be reduced. Hence, although firms that enjoy positions of market power based on high entry barriers can raise prices above costs and generate supernormal profits, some may opt for the quiet life and tolerate a degree of inefficiency. It follows that their first reaction to the elimination of entry barriers may be to reduce costs.

Therefore transfer of ownership (privatisation) that fails to reduce market power of firms results in cost cutting through labour shedding rather than wage cuts Indeed the market power position of the firm may be exploited more actively {and shared less through managerial slack) if prices were restrained by government controls prior to privatisation

WAGE DETERMINATION AS A FORM OF RENT SHARING

Having identified the origins of product market power and demonstrated that the implied deviation from a competitive product market is non-trivial, we need to assess the importance of such imperfections for employment The most widely developed route for such an influence is through wage setting and this is the focus of the next section. However, there are other routes through the output implications of market power and through expenditure on strategic investments, such as RGD, capacity and workforce skills.

This section is divided into four parts. Each relates to a different set of empirical models looking for evidence of whether *supra*-competitive rents are appropriable by workers. The first is the literature over what has come to be called inter-industry wage differentials The second looks for evidence that product market rents

are captured from enterprises within industries. This is achieved by: a) relating wages explicitly to "insider variables" (such as proxies for product market power); *b)* relating profitability to measures of market structure interacted with unionisation; and c) event studies which examine the impact of deregulations/privatisations, which claim to be the economic analogue of natural experiments. The third part examines whether wage premia are due to labour rents alone, generated by the positive dependence of productivity on wages. This goes under the rubric of efficiency wages. Finally, the idea that wages may be **less** than marginal revenue products because of employer monopsony power is considered.

Inter-industry wage differentials

Industrial relations experts have long noted the existence of great variation in the wages paid to seemingly identical individuals depending on the industry in which they worked These industry wage premia are the observable effects of working in a particular industry after controlling for human capital and other individual characteristics. If significant inter-industry wage differentials exist and persist the view of labour markets as competitive is called into question. Krueger and Summers (1988), using a variety of data sources but in particular the US Current Population Studies from May 1974, 1979 and 1984, claimed to establish the following,

1 Inter-industry differentials are substantial.

2. They are stable across time and therefore unlikely to be due to temporary market disequilibria.

3. They are similar across industrial nations, so do not seem to be due to specific institutional features of the US or other particular economies

4 They cannot be explained away by competitive forces such as compensating differentials or unobserved labour quality

Claim 1 is not controversial and has been established by a number of independent researchers (Dickens and Katz, 1987, Murphy and Topel, 1987; Katz and Summers, 1989). For example, observationally identical workers earned the following (employment weighted) different mark-ups in 1984 (Krueger and Summers, 1988, Table I, column 4): Petroleum +37 per cent, mining +24 per cent, chemicals +22 per cent, business services 0, eating and drinking –22 per cent, welfare services –33 per cent. The standard error of the wage equation falls by 4.3 percentage points when industry dummies are included – this compares to a 5.6 reduction when human capital controls are added.

The temporal stability of the effects (claim 2) is beyond serious doubt for the US (see also Slichter, 1980) The correlation of industry differentials between 1974 and 1984 is 0.91. Even more remarkably, Krueger and Summers (1987) find that the correlation of industry differentials for unskilled workers between 1923 and 1984 is

0.56 – incredibly stable for over 60 years. Claim 3, the international similarity of differentials, is of crucial interest to this study. Krueger and Summers use the ILO Yearbook of Labour Statistics to demonstrate that the correlation of industry differentials in 14 countries with those of the US was high (on average 0.82 in 1982). These raw differentials, although suggestive, do not take any other factors into account. There now exists a more substantial catalogue of international industry differentials (*inter alia* Wagner, 1990; Borland and Suen, 1980; Garner and Grenier, 1990; Hofer, 1992; Haskel and Martin, 1990). These studies do indeed suggest that industry rents are robust to controls for individual characteristics, stable over time and similar to those found in the US.

Claim 4 is the most hotly debated issue, and it does not always get support (*e.g.* Edin and Zetterberg, 1990). The main contenders for explaining wage differences within the competitive framework are compensating differentials and unobserved labour quality To the extent that these are associated with the technology of the industry in question, they would also account for the temporal and spatial stability of pay premia. Two pieces of indirect evidence weigh against the competitive rationalisation: job queues and between occupation studies. If, in equilibrium, real wage differences are equalised across industries one would not expect to see job rationing and workers queuing for "good jobs" in high wage industries. Yet this is exactly what we do see. Tenure and job applications are raised, turnover and quits reduced by higher industry differentials (Pencavel, 1972; Krueger and Summers, 1988; Holzer *et al.*, 1988; Katz and Summers 1989) The second piece of indirect evidence arises because industry differentials appear very similar for different occupations within the same industry As Layard, Nickell and Jackman (1991) put it: "In a competitive market it would be easy to see why workers on oil platforms get rewarded for the fact that their work is dangerous; however, there is no reason for clerical workers in a petroleum company to be paid more than the prevailing average for clerical workers" (p. 179).

But what of the direct evidence? Studies of compensating differentials do not often find evidence for equalising differences (*e.g.* Brown, 1980 could not even find a statistically significant premium for death risk). Including ten non-pecuniary advantages into their standard wage equations in the *Quality of Employment Survey*, Krueger and Summers (1988) found that the standard deviation of industry wage premia actually increased Neither could Murphy and Topel (1987) find any substantial effect from including variables to measure variability of employment Edin and Zetterberg (1990), on the other hand, found in Sweden that all bar three industry premia are driven to zero except when workplace characteristics are included. Yet Sweden has been characterised by the solidaristic wage policy centrally negotiated by unions and employers rather than the decentralised and largely non-union American system.

The unobserved labour quality argument has received the most attention. Murphy and Topel (1987) and Krueger and Summers (1988) use matched samples of the CPS and estimate wage change equations. Although the latter authors find that their panel estimates have not substantially changed, Murphy and Topel argue that the fixed effect of "ability" explains about 70 per cent of the industry premia It seems likely that Murphy and Topel's estimates of industry differentials are biased downwards because i) they use not actual but primary industry of individuals in the previous year and *ii)* they estimate occupation-industry cells. More of the variability in occupational wage differences probably reflects unobserved ability. If switching jobs is a choice variable, then workers will migrate to better industrial job matches. Thus, a worker who moves will appear to get an industry wage premium even though the switching may represent better matching of ability. Consequently, Krueger and Summers (1988) and Gibbons and Katz (1991) use information from the CPS Displaced Workers Survey which has information on workers who lost their jobs as a result of plant closure, lay-offs or redundancies making the job changes involuntary Gibbons and Katz' estimates suggest that only 12-37 per cent of the industry wage premia can be explained by ability using this method.

The evidence for the existence and persistence of substantial industry wage differentials appears strong and resistant to purely competitive labour market explanations. Their existence requires explanation, and raises important questions such as: "what is the source of these rents?" and, "are firms rather than industries the prime repository of market power?" Empirical work has been far less successful in finding an explanation for industry wage premia than it has been in identifying them. The industry differentials are correlated with the following variables (Dickens and Katz, 1987).

- union density;
- industry profitability;
- industry concentration;
- R&D intensities;
- capital-labour ratios

Union power may be the most obvious explanation as collective bargaining could both re-distribute rents to workers, and, if the union organises the whole industry or can limit labour supply, generate rents (see Stewart, 1990). In the US however, industry premia are still large for non-union members and union density varies greatly across countries and over time, despite the evidence that the industry wage differentials display a remarkable stability

Market power (as proxied by profits or concentration, for example) would also seem a likely candidate and we examine it more closely below Quasi-rents from innovation and investment may also lie behind the existence of rents, so these are

also considered. In the US literature, efficiency wage theory is the common explanation of such premia, so these are the subject of the final part of this section.

The capture of product market rents

Evidence from wage equations

Substantial Variability of firm performance exists within industries (and indeed the very notion of whether the "industry" is a coherent unit of analysis is, for some, questionable) Even after accounting for individual and industry characteristics Groshen (1991) found that over 50 per cent of the variability of wages remained unexplained. There is a large body of literature which seeks to relate wages to firm and establishment characteristics. A popular methodology is to include both firm-specific "insider" and more aggregate "outsider" variables (which would cover industry affiliation) in a firm level wage equation to gauge the relative importance of the two. Wages are essentially determined by a weighted average of the "alternative wage" and per capita profitability {Christofides and Oswald, 1992; Denny and Machin, 1991), revenue (Svenjar, 1986) or average productivity (Gregg and Machin, 1991). Empirical estimates of insider power have generally been small, but significant relative to outside influences. For example, in fitting an equation of the form.

$$\text{Wages} = (1 - y)\ (\text{alternative wage}) + y\ (\text{insider factors})$$

and allowing for partial adjustment in wages, Nickell and Wadhwani (1990) estimated $0\ 08 \leq y \leq 0.15$. They went on to argue that y was positively associated with decentralised bargaining and not with unionism *per se*. A similar picture emerges from Holmlund and Zetterberg (1989) who found that the weight given to insider factors was much larger for countries with decentralised bargaining systems (US had a y of 0.3 compared with effectively zero in Sweden, Norway and Finland).

As with the inter-industry differentials, the "insider power" studies do not distinguish the source of the rents that workers share There is a substantial literature providing evidence of a weak positive correlation between wages and concentration, but this is generally not robust when measures of labour quality are included (see the surveys in Dickens and Katz, 1987 and Blanchflower, 1986). This could be due to the weakness of concentration as a proxy for market power, collusion being less important than firm specific factors (Schmalensee, 1989, stylised fact 4 11) An alternative explanation is that colluding employers can weaken the ability of workers to get higher wage gains by using divide and rule tactics.

Firm and establishment research examining directly the effects of dominance in the product market on wages is much more supportive of product market rent-

sharing. Stewart (1990) and Blanchflower *et al.* (1990) using the 1984 Workplace Industrial Relations Survey shows that significant wage differentials are achieved when managers perceive themselves to be faced by few or no competitors. Nickell, Vainiomaki and Wadhwani (1992)and Van Reenen (1996)examine a firm-level panel and find a role for market share in their wage equations. Gregg and Machin (1992) found that wage growth was slower in firms where managers felt competitive pressures had increased in their product markets.

One of the main criticisms of the regressions used to examine rent sharing is that the measures of rents are endogenous. Wage shocks will obviously affect the level of rents as well as *vice versa*. To deal with the simultaneous determination of wages and rents some of the above papers have instrumented the rents term in the wage equation. A general finding is that using external instruments tends to produce much higher estimates of rent-sharing than simple OLS models. For example, Abowd and Lemieux (1993) instrument their measure of quasi-rents with import and export prices (correlated with rents but unaffected by a firm-specific increase in wages). They find that after correcting for endogeneity almost 30 per cent of the rents are captured by workers in their sample of Canadian collective bargaining contracts. More recent studies using innovations as an instrument in British firms have found similarly high measures of rent sharing (see Van Reenen, 1996 – but also see Blanchlower *et al.*, 1996 – suggesting that there are smaller effects in the US).

Despite these findings there is still a question mark over the role of unions. It is well established from micro data that the union mark-up is not a statistical artifact arising from differential abilities of unionised workers (*e.g.* Jakubson, 1991), temporary shocks or mis-specification (Stewart, 1987) and, for Britain, is in the region of 8-10 per cent. But is the source of the mark-up a redistribution of rents? Stewart's (1990) work suggests that it is, but many other studies do not (*e.g.* Nickell *et al.*, 1992). It is an important issue: if unions merely redistribute rents from shareholders to workers and leave employment unaffected, then there will be no negative employment effects of an exogenous shift in insider power. This could happen if unions struck "efficient bargains" with managers, simultaneously bargaining over wages and employment. By only bargaining over wages both sides end up at an inefficient solution. Abowd (1989) showed that falls in shareholder's wealth after a successful union election (as measured by changes in the stock market value of the firm) were exactly offset by gains to union wealth (higher wages at the same employment). If this was generally true, then the NAIRU analyses would be seriously misleading. Reducing insider power would change the distribution of wealth rather than reducing unemployment and raising efficiency. Unfortunately, most attempts to test between the "Efficient Bargaining" and "Labour Demand" union

models have yielded ambiguous results (see Pencavel, 1991 for a survey and critique).

Evidence from profitability equations

An attractive way to look for evidence of worker appropriation of the gains from tacit collusion emerges naturally from the history of the Structure-Conduct-Performance paradigm. Omitting union power from a profitability equation will bias downwards the coefficient on proxies for market power if unions are sharing the gains from collusion. In the long run, the only industries where union power should depress profits are those where market power exists and a surplus can be shared. Consequently, the importance of an interaction term between say, union presence and concentration should give some insight into how rents are divided between capital and labour.

The British evidence is generally favourable to the rent sharing hypothesis. At the industry level Conyon and Machin (1991*a*) find that the elasticity between profit margins and concentration rises from 0.089 to 0 146 when one controls for union coverage and industry unemployment. Furthermore, the depressing effects of union power seem confined to concentrated industries (Conyon and Machin, 19916).One objection to their study is that the union interaction is merely another variable in disguise. Haskel and Martin (1993), using a similar data set over the same period (1983-86) wipe out the union interaction by including an unemployment-concentration interaction. Nevertheless, they still interpret this as a bargaining effect due to unions being stronger when unemployment is low. Fortunately, the rent-sharing story is supported by work at a lower level of aggregation. Using a two year panel of 145 manufacturing firms Machin (1991) found that the negative effects of union recognition on accounting profits were confined to firms with higher market shares or high levels of industry coverage Similarly Machin and Stewart (1990)found that the union-induced reduction in managers' perceptions of their plant's financial performance were only significant when the establishment had a high share of industry employment or faced few competitors This is consistent with a strongly efficient model of union bargaining where it is only rents which are redistributed without negative employment consequences

A similar pattern appears in the US literature Early studies which found a significantly negative effect of unions only in concentrated industries (*e.g.* Karier, 1985) have been sharply criticised for being unrobust (e.g Connoly, Hirsch and Hirschey, 1986) The micro evidence seems more secure (see Clarke, 1984, however, for an exception) but is given a sharply different interpretation. It is argued that organised labour skims off the rents from investment in general and innovative activity in particular. Rather than being a countervailing force to monopoly power, unions are prematurely harvesting long-lived capital and so destroying the eco-

nomic crops (Grout, 1984 gives the theoretical statement and Hirsch, 1989, some corroborating evidence) This argument would hold good even if union bargains were strongly efficient, so long as the union's time horizon was shorter than the firm's (Baldwin, 1983).The British evidence, however, does not in general support the existence of these negative investment or innovation effects (Menezes-Filho, Ulph and Van Reenen, 1995 and Metcalf, 1993).

Evidence of the effects of innovation and investment on wages has recently flourished. The recent studies to tackle the issue head on have found positive effects to be the rule (see the survey in Chennells and Van Reenen, 1995, or Van Reenen, 1996) The difficulty is to disentangle whether the effect is due to rent sharing skill upgrading or unobserved ability. New technology may lead to upgrading in the human capital mix, higher effort and short-run increases in wages to attract more workers, all of these would lead to higher wages for purely competitive reasons By focusing on the impact on wages in the firm which first commercialised an innovation and looking at longer-run effects, Van Reenen's (1996) study showed that most of the wage impact appeared to be due to sharing in the rents rather than purely competitive forces An increase in this complementarity or an increase in the pace of technological change will mean that technological rent-sharing will generate increased wage inequality until there is a supply side response in increased training. Since this response tends to be very slow, some writers have suggested that technological factors lie behind the very large increases in wage dispersion witnessed in many industrialised countries in recent years (e.g. Juhn, Murphy and Pierce, 1993).

Evidence from event studies

One of the main criticisms of the regressions used *to* examine rent sharing is that the measure of rents used are endogenous Wage shocks will obviously affect market power as well as vice *versa* Using instrumental variable techniques is one solution, but there are always major questions surrounding the validity of the instruments A popular response is to look for "natural experiments" in the data such as deregulations or privatisations

Rose's (1987) study of the trucking industry revealed that the Teamsters Union captured about two-thirds of the industry's rents, whereas non-unionists were substantially unaffected. Hirsch (1988, 1993) comes to a similar conclusion. Card's (1989) examination of airline deregulations, however, did not find dramatic falls in the union mark-up, but it is not clear that monopoly power has been reduced in this industry

Card's study reflects a general problem as many deregulations have not been obviously associated with a decrease in monopoly power. As in the case of Britain's

privatisation programme there is a feeling that the main change has been in transferring a state monopoly into a private one in order to maximise the revenues from selling off the public assets. This may be one of the reasons why there has been far less work in Britain and other European countries on the wage effects of deregulation. It seems that the productivity gains have come predominantly from labour shedding rather than output increases/price decreases even where wage reduction has occurred (Haskel and Szymanski, 1992; Domberger *et al.*, 1986).There is also considerable doubt over whether the cost reductions are viable in the long run without substantial wage reductions. For example, the compulsory contracting out of British refuse collection appears to have caused private operators to offer unsustainably low prices in order to be the winning inside bidders when the contracts are renegotiated (Szymanski and Wilkins, 1993).In this case though reductions in wages were often substantial and coincident with increases in hours and reductions in other employment rights.

Labour rents: efficiency wages

Since there is a common belief that US product markets are more competitive than European ones, US economists have tended to play down the relative importance of product market power as an explanation of industry wage premia and have emphasised efficiency wages. Additionally, the manufacturing sector appears to offer the highest inter-industry wage premia and yet faces stiffest foreign competition relative to other sectors. However, if it is decentralisation of the wage bargaining process which gives insiders their power rather than union strength *per se* then the fact that US industry wage premia are very high and Nordic ones very low should come as no surprise. The US wage premia may be driven by the greater decentralisation of bargaining The fact that union wage premia are also internationally high in the US could be due to a similar process where unions can "leap frog" each others' pay claims.

There are many versions of the efficiency wage hypothesis (see Akerlof and Yellen, 1986, for a survey). The common theme is that firms have an incentive to raise wages above the market clearing level in order to elicit higher productivity. There are many versions of the transmission mechanism and we offer three examples here The turnover model says that higher wages will reduce turnover (Salop, 1979); the Shapiro-Stiglitz (1984) effort model suggests that a higher wage increases the costs of getting caught shirking on the job, sociological theories of gift exchange (Akerlof, 1982) argue that workers will feel aggrieved unless they receive a "Fair wage". These models generate equilibrium involuntary unemployment because the firm will not always lower wages even if there is an unemployed worker who would do the same job for below the prevailing wage of the firm. This is because cutting the wage would have a detrirnental effect on productivity and profitability. At this

equilibrium an increase in wages will still increase productivity, but not by enough to offset the loss of profits. Thus it is wrong to imagine that efficiency wages rely on any imperfections in the product market, although one could certainly combine both types of models (e.g. Layard *et al.*, 1991).

Indirect tests of efficiency wages were described earlier in this section. Unfortunately, direct tests of these models have rarely been successful, usually because observable proxies for the theoretical constructs are hard to find. The most common approach is to estimate a production function with extra terms to represent the "cost of job loss" such as the firm's own wage compared to the prevailing alternative wage. Some evidence in favour of the significance of these terms was given by Wadhwani and Wall (1992) using a firm level panel. The main problem with this is that, as the authors admit, their results are observationally equivalent to a compensating differentials or bargaining model. Machin and Manning (1992) try to overcome this by looking at the different predictions regarding the short-run dynamics of these models They found that the efficiency wage model worked only in industries where union density was low. Even then, their results depend on some restrictive assumptions over the dynamics and, like the Wadhwani and Wall model, only one version of the efficiency wage hypothesis, namely the shirking model of Shapiro and Stiglitz, is tested. Other attempts to test the shirking model by relating wages to monitoring intensity by using the proportion of supervisors have been quite unsuccessful (Leonard, 1987).

The turnover model has received more attention. Several writers have estimated quit, turnover, and recruitment equations and related them to wages. As mentioned earlier, quit rates usually decline with industry wage premia. Firm level wages in a quit function have the advantage of disaggregation, but the disadvantage of endogeneity. A firm which by accident pays higher wages will have lower quits, there is nothing special about efficiency wage theory in predicting this. Moreover, the parameter estimates from such studies are usually quite small which casts doubt on whether falls in turnover costs could be large enough to offset the loss of profits in increasing the wage and be a significant driving force behind the wage structure (Leonard, I987 and Campbell, 1993)

A further problem with the effort and turnover based efficiency wage models is that they are technologically based. We would expect wages to be highest where turnover costs are high and monitoring of worker effort is very difficult. Some authors argue that capital-labour ratios are a good proxy for these (e.g. Howell, 1989), but capital intensity could easily be correlated with other things such as high ability. Yet the fact we observe similar industry wage premia for different occupations casts doubt on these stories, as the technologies are very different across occupations in the same industry. Ironically, the sociological version of efficiency

wages may be the most attractive alternative, but also the one which is hardest to implement empirically.

Monopsony: wage below marginal revenue product

An alternative representation of efficiency wage arguments with very different implications for the impact of market power on employment is where **employers** enjoy power within the labour market (or monopsony power) Monopsony models have many similarities with efficiency wage models but imply wages below the workers marginal revenue product. For instance a model derived from turnover costs faced by the worker, rather than the firm as in the model of Salop (1973), implies firms face an upward sloping supply curve and will offer lower wages and employ fewer workers than in a competitive market (see Burdett and Mortensen, 1989) Monopsonistic conditions were normally studied in situations with a single employer of a certain labour type, e.g governments being a dominant employer in university lecturers or health workers (see Sullivan, 1989) However, more recently the potential existence of monopsonistic power in low-wage labour markets has been debated extensively in the US and UK. The debate has largely been in the context of the employment consequences of minimum wages {Card, 1991; Katz and Krueger, 1992; Machin and Manning, 1992). However, Machin, Manning and Woodland (1993) investigate the role of monopsony in a UK low-wage labour market not subject to minimum wage criteria This work is as yet inconclusive as to the pervasiveness of monopsony power but it does imply that the employment consequences of minimum wage legislation may have been overstated in past work.

In conclusion, there appears to be considerable evidence of insider rent-sharing from industries, firms and establishments Although clearly linked to product market power, rents from efficiency wage considerations, investment and innovation may also be important. Tying down the precise economic model, especially as it concerns the role of union bargaining, has been less successful than the demonstration of the existence of imperfections.

CONCLUSIONS AND POLICY IMPLICATIONS

Unemployment is recognised to be a phenomenon intimately linked with supply-side phenomena of imperfect competition In the popular "NAIRU" framework this is due to insider power (a category wider than just unions) in the labour market, and less commonly recognised, monopolistic power in the product market.

This paper thus assesses the extent of product market imperfections and their importance in wage setting. It concludes that product market imperfections are widespread and although large deviations of price above marginal cost appear to be

short lived, they do not return to zero, so small mark-ups persist These mark-ups are maintained by barriers to entry of various kinds – product differentiation, cost advantages, and economies of scale. They boost profit margins and reduce output The evidence that such surplus rents are shared with workers is clear. At the level of the industry, wage premia are related to the presence of rents but this cannot explain all of the apparent variation in wages above levels predicted by human capital or compensating differentials. What is more such mark-ups are not solely generated/captured by unions. Company/plant level evidence (including event studies) indicates that unions capture rents, however, reductions in union influence may reduce but would not eliminate wage premia. Moreover, such a reduction in collective power would also alter the distribution of wages if the premia are determined by an individual's characteristics in the absence of the union bargain. The macroeconomic implications of the existence and capture of surplus rents is difficult to assess given the little empirical analysis at the aggregate level.

The implication is that reductions in product market imperfections (*i e.* removing barriers to entry/exit) would reduce rent capture and raise employment. There is a caveat to this, transferring a near monopoly from the public to the private sector may produce employment shedding rather than wage cuts and employment growth. Such changes of ownership result in major cost cutting through employment. A similar result holds for private sector firms suddenly losing a cartel or other market advantage. Lower wages tend to result when deregulation is accompanied by sharp increases in competition and casualisation of labour inputs

The basic competitiveness of any market is determined by two things: the height of entry barriers, and prevailing market conditions. Economies of scale, for example, present a formidable barrier to entry in stagnant or declining markets where entrants will have to compete vigorously for sales against entrenched incumbents anxious not to lose market share and so incur cost penaities. In growing markets, on the other hand, it is often possible for an entrant to acquire a sufficient market share to build a plant of minimum efficient scale without taking sales from existing firms, and in such settings entry will be considerably easier. Similarly, as consumers become wealthier and more confident, their demand for diversity increases, and this enables numerous more customised suppliers to inhabit specific market niches profitably, despite high set-up costs, an inability to exploit economies of scale, lack of access to mass distribution outlets and other disadvantages.

It follows from this observation that there are two types of policy lever which might be used to lower entry barriers and make markets more competitive: those which affect prevailing market conditions and those that operate specifically on barriers to entry. Consider each in turn

Most conventional macroeconomic policy tools have an effect on the competitiveness of markets because they affect basic conditions of demand and costs. However, most macro policy tools affect all firms in a market, entrants and incum-

bents alike, and this means that they often do not affect the wedge between entrants and incumbents which is responsible for deterring entry. Thus, using monetary policy to reduce the costs of capital will make it easier to finance entry, but also for incumbents to expand, and it is by no means clear that entrants will emerge as the net beneficiaries. Other policies, such as subsidising R&D or training or providing financial assistance for exporters are likely to benefit well-established firms more than they benefit new entrants, and are, therefore, likely to make entry more difficult. As the examples cited two paragraphs above suggest, the major exception to this conclusion lies with barriers created by scale economies or large fixed costs. In this case, what matters to both entrants and incumbents alike is market size, and macroeconomic policies, which expand the size of particular markets, reduce the limit on firm numbers which economies of scale creates, and so facilitate entry.

Micro based policies which aim directly at reducing particular types of barriers to entry are more direct. The major problem with this kind of policy is that it will always be inherently selective and discriminatory. Selectivity arises partly because policy makers must choose which particular types of entry barrier to address, but mainly because the importance of particular types of entry barriers (as well as their height overall) varies across markets. That is, the importance of barriers to entry is market specific, and, to be effective, policy must also be so. Competition policy is an obvious example of the kind of policy which is called for

Nevertheless, there is a case to be made in favour of the view that policy makers ought to concentrate attention on certain types of entry barriers wherever they appear in particular markets. The 1992 single market programme of the EC, for example, focuses on trade barriers which impede the realisation of scale economies, and on subsidies and home biases in national procurement policies. Similarly, numerous policies aimed at small business are focused on filling the so-called "equity gap" that is alleged to arise from the unwillingness of large financial institutions to lend to small firms. Finally, some countries have tried to stimulate the diffusion of new technology by loosening patent restrictions or positively promoting the flow of new information (particularly from abroad). These types of policies are usually designed to give administrators enough flexibility to adapt them to the particular circumstances of particular markets, and many succeed in doing so. What limits the appeal of these policies is that there is no one simple panacea to the problem of market power. monopoly can be created on any number of bases (*i.e.* on anything which drives a wedge between the costs or demand of the monopolist and that of any putative rival), and sustained on any number of other bases

It follows, then, that policy towards competitiveness must be thought of in terms of a **fluid portfolio** of specific initiatives targeted at particular types of entry barriers, and applied in somewhat different ways in the different sectors where particular barriers exist.

BIBLIOGRAPHY

ABOWD, J.M. (1989), "The effect of wage bargains on the stock market value of the firm", *American Economic Review,* 79(4), pp. *774-809.*

ABOWD, J.M. and T. LEMIEUX (1993), "The effects of product market competition on collective bargaining agreements: the case of foreign competition in Canada", *Quarterly Journal of Economics,* CVIII, pp. 983-1014

AKERLOF, G.A. (1982), "Labour contracts as partial gift exchange" *Quarterly Journal of Economics, 97,* pp. *543-69.*

AKERLOF, G.A. and YELLEN (1984). "Gift exchange and efficiency wage theory: four views", *American Economic Review,* 74(2), pp. *79-83.*

APPELBAUM, E. (1979), "Testing price taking behaviour", *journal of Econometrics, 9,* pp. *283-94.*

APPELBAUM, E. (1982), "The estimation of the degree of oligopoly power", *Journal of Econometrics,* 19, pp. 187-299.

ARROW, K. (1962), "Economic welfare and the allocation of resources for inventions", in R. Nelson (ed.), *The Rate and Direction of Inventive Activity,* Princeton University press, Princeton.

ASHENFELTER, O. and D. SULLIVAN (1987), "Nonparametric tests of market structure: an application to the cigarette industry", *journal of Industrial Economics, 35,* pp. *483-98.*

BAILEY, E. (1976), "Price and productivity changes following deregulation: the US experience", *Economic journal, 96,* pp. 1-17.

BAIN, J. (1956), *Barriers to New Competition,* Harvard University Press, Cambridge Mass.

BAKER, J. and T. BRESNAHAN (1985), "The gains from merger or collusion in product-differentiated industries", *Journal of Industrial Economics, 33,* pp. *427-44.*

BALDWIN, C. (1983), "Productivity and labour unions: an application of the theory of self-enforcing contracts", *journal of Business,* 56(2), pp. 155-85.

BAUMOL, W., J. PANZAR and R. WILLIG (1982), *Contestable Markets and the Theory of Market Structure,* Harcourt, Brace and Jovanovich, New York.

BEAN, C. (1993), "European unemployment: a retrospective", paper given at the European Economic Association Conference, Helsinki.

BIGGADIKE, E. (1976), *Entry, Strategy and Performance,* Division of Research, Harvard Graduate School of Business, Harvard University.

BILS, M. (1987), "The cyclical behaviour of marginal cost and price", *American Economic Review, 77,* pp. 838-85.

BLANCHAR&D, O.J, and L.H. SUMMERS (1989), *Lectures in Macroeconomics,* MIT Press.

BLANCHFLOWER, D., A. OSWALD and M. GARRETT (1990), "Insider power in wage determination" *Economica, 57,* pp. 143-70

BLANCHFLOWER, D., A. OSWALD and P. SANFREY (1996), "Wages, profits and rent-sharing" *Quarterly journal of Economics,* February

BORLAND, J. and A. SUEN (1980), "The determinants of individual wages in Australia: competitive and non-competitive influences", *The Australian Economic Review,* pp. *33-44.*

BOROOAH, V. and F. VAN DER PLOEG (1986), "Oligopoly power in British industry", *Applied Economics,* 18, pp. *583-98.*

BRESNAHAN, T. *(1981),* "Departures from marginal-cost pricing in the American automobile industry: estimates for 1977-1978", *journal of Econometrics, 9,* pp. 1010-1019.

BRESNAHAN, T. and P. REISS (1988), "Do entry conditions vary across markets?", *Brookings Papers on Economic Activity, 3,* pp. *833-881.*

BRESNAHAN, T. (1989), "Empirical studies of industries with market power", forthcoming in R. Schmalensee and R. Willig (eds.), *Handbook of Industrial Economics,* North Holland, Amsterdam.

BROCK, G. (1975), *The US Computer Industry: A Study of Market Power,* Ballinger, Cambridge, Mass.

BROWN, R. (1978), "Estimating advantages to large scale advertising", *Review of Economics and Statistics, 60,* pp. *428-37.*

BROWN, C. (1980), "Equalizing differences in the labour market", *Quarterly Journal of Economics, 94(1),* pp. *113-34.*

BUR&DETT, K. and D. MORTENSEN (1989), "Equilibrium wage differentials and employer size", University of Essex, mimeo.

CALMFORS, L. and J. DRIFFEL (1988), "Centralisation of wage bargaining and macroeconomic performance", *Economic Policy, 6,* pp. *13-61.*

CAMPBELL, C. (1993), "Do firms pay efficiency wages?Evidence with data at the firm level", *journal of Labour Economics, 11,3,* pp. 442-470.

CAR&D, D. (1989), "Deregulation and labour earnings in the airline industry", Princeton University Industrial Relations Section, Working Paper No. *247.*

CAR&D, D. (1991), "Do minimum wages reduce employment?A case study of California 1987-89", NBER Working Paper No. *3710.*

CARLIN, W. and D. SOSKICE *(1990),* *Macroeconomics and the Wage Bargain,* Oxford University Press.

CARLSSON, B. (1989), "Flexibility and the theory of the firm", *International journal of Industrial Organization, 7,* pp. 179-204.

CHENNELLS, L. and J. VAN REENEN (1993*b*), "Getting a fair share of the plunder?Technological change and the wages structure", Institute for Fiscal Studies, Working Paper 93/3.

CHRISTOFIDES, L.N. and A.J. OSWALD (1992), "Real wage determination and rent-sharing in collective bargaining agreements", *Quarterly Journal of Economics,* 107 (3), pp. 985-1002.

CLARK, K. (1984), "Unionization and firm performance: the impact on profits, growth and productivity", *American Economic Review,* 74(5), pp. 893-919.

COMANOR, W. and T. WILSON (1979), "The effect of advertising on competition: a survey", *journal of Economic Literature,* 17, pp. 453-76.

CONNOLY, R.A., B.T. HIRSCH and M. HIRSCHEY (1986), "Union rent seeking, intangible capital and market value of the firm", *Review of Economics and Statistics,* pp. 567-77.

CONYON, M. and S.J. MACHIN (1991*a*), "The determination of profit margins in UK manufacturing", *journal of Industrial Economics,* 39(4), pp. 369-382.

CONYON, M. and S.J. MACHIN (1991*b*), "Market structure and the empirical specification of profit margins", *Economic Letters,* 35, pp. 227-31.

COWLING, K., J. CABLE, M. KELLY and T. McGUINESS (1975), *Advertising and Economic Behaviour,* Macmillan, London.

CUBBIN, J. (1975), "Quality change and pricing behaviour in the UK car industry", *Economica,* 42, pp. 45-58.

DAVIS, E. (1984), "Express coaching since 1980: liberalization in practice", *fiscal Studies,* 5, pp. 76-86.

DENNY, K. and S.J. MACHIN (1991), "The role of profitability and industrial wages in firm-level wage determination", *Fiscal Studies,* 12, pp. 34-45.

DICKENS, W.T. and L.F. KATZ (1987), "Inter-industry wage differences and industry characteristics" in K. Lang and J.S. Leonard.

DICKENS, W.T., L. KATZ, K. LANG and L.H. SUMMERS (1989), "Employee crime and the monitoring puzzle" *Journal of Labour Economics,* 7(3) pp. 331-47.

DIXIT, A. (1980), "The role of investment in entry deterrence", *Economic Journal,* 90, pp. 95-106.

DOMBERGER, S., S. MEADOWCROFT and D. THOMPSON (1986), "Competitive tendering and efficiency: the case of refuse collection", *Fiscal Studies,* 7(4), pp. 69-87.

DOWRICK, S. (1989), "Union-oligopoty bargaining", *Economic journal,* pp. 1123-1142.

EATON, C. and R. LIPSEY (1978), "Freedom of entry and the existence of pure profits", *Economic Journal,* 88, pp. 455-69.

EDIN, P. and J. ZETTERBERG (1989), "Inter-industry wage differentials: evidence from Sweden and a comparison with the United States", Trade Union Institute for Economic Research Working Paper.

EEC (1988), "The economics of 1992", *European Economy,* 35, pp. 1-22.

ERICKSON, W. (1976), "Price fixing conspiracies: their long term impact", *journal of Industrial Economics,* 26, pp. 189-202.

FISHER, F. (1987), "Pan-American to united: the pacific division transfer case", *Randjournal of Economics,* 18, pp. 492-508.

GELFAND, M. and P. SPILLER (1987), "Entry barriers and multiproduct oligopolies", *International journal of Industrial Organization,* 5, pp. 101-114.

GERA, S. and G. GRENIER (1990), "Interindustry wage differentials and efficiency wages: some Canadian evidence", Economic Council of Canada Working Paper 19.

GEROSKI, P. (1988), "In pursuit of monopoly power: recent quantitative work in industrial economics", *journal of Applied Econometrics,* 3, pp. 107-124.

GEROSKI, P. (1989*a*), "The effect of entry on profit margins in the short and long run", *Annales d'Économie et de Statistique,* 15\16, pp. 333-53.

GEROSKI, P. (1989*b*), "Entry, innovation and productivity growth", *Review of Economics and Statistics,* 71, pp. 572-78.

GEROSKI, P. (1991), "Domestic and foreign entry in the UK: 1983-84", in P. Geroski and J. Schwalbach *Entry and Market Contestability,* Basil Blackwell, Oxford.

GEROSKI, P. and A. MURFIN (1990), "Advertising and the dynamics of market structure: the UK car industry 1958-1983", *British journal of Management,* 1, pp. 77-90.

GEROSKI, P., R. GILBERT and A. JACQUEMIN (1990), *Barriers to Entry and Strategic Competition,* Harwood Academic Press, London.

GEROSKI, P. and J. SCHWALBACH (1991), *Entry and Market Contestability,* Basil Blackwell, Oxford.

GEROSKI, P. (1993), *Entry and Market Dynamics,* Basil Blackwell, Oxford.

GIBBONS, R. and L. KATZ (1992), "Does unmeasured ability explain inter-industry wage differentials" *Review of Economic Studies,* 3, pp. 20-59.

GOLLOP, F. and M. ROBERTS (1979), "Firm interdependence in oligopolistic markets", *journal of Econometrics,* 10, pp. 313-331.

GORECKI, P. (1986), "The importance of being first: the case of prescription drugs in Canada", *International journal of Industrial Organization,* 4, pp. 371-96.

GORT, M. and S. KLEPPER, (1982), "Time paths in the diffusion of product innovations", *Economic journal,* 92, pp. 630-53.

GRABOWSKI, H. and J. VERNON (1982), "The pharmaceutical industry", in R. Nelson (ed.), *Government and Technical Progress,* Pergamon Press, Oxford.

GREGG, P. and S.J. MACHIN (1991), "Unions, the demise of the closed shop and wage growth in the 1980s", *Oxford Bulletin of Economics and Statistics,* 54, pp. 53-72.

GRIFFEN, J. (1985), "OPEC behaviour. A test of alternative hypotheses", *American Economic Review,* 75, pp. 954-63.

GRILICHES, Z. (1984), "R&D, patents and productivity", Chicago: NBER.

GRINDLEY, P. and R. McBRYDE (1989), "The use of product standards in business strategy: video cassette recorders", mimeo, London Business School.

GROSHEN, E.L. (1991), "Five reasons why wages vary among employers", *Industrial Relations,* 30(3), pp. 350-81.

GROUT, P.A. (1984), "Investment and wages in the absence of binding contracts: a Nash bargaining approach", *Econometrica,* 52(2), pp. 449-60.

HALL, R. (1988), "The relation between price and marginal cost in US Industry", journal of Political Economy, 96, 51, pp. 921-947.

HALL, R. (1990), "Invariance properties of Solow's residual", in P. Diamond (ed.), Growth, productivity and employment, MIT Press.

HASKEL, J. and C. MARTIN, (1990), "The inter-industry wage structure: evidence for Britain", mimeo, Queen Mary and Westfield College.

HASKEL, J. and C. MARTIN (1993), "Margins, concentration, unions and the business cycle: theory and evidence for Britain", International Journal of Industrial Organisation, 10(4), pp. 611-623.

HASKEL, J. and S. SZYMANSKI (1992), "The effects of privatisation, restructuring and competition on productivity growth in UK public corporations", mimeo Queen Mary and Westfield College.

HIRSCH, B.T. (1988), "Trucking regulation, unionisation and labour earnings 1973-85", Journal of Human Resources, 23, pp. 296-319.

HIRSCH, B.T. (1989), "Labour unions and the economic performance of US firms", mimeo, Department of Economics, University of North Carolina.

HIRSCH, B.T. (1993), "Trucking deregulation and labour earnings: is the union premium a compensating differential?", journal of Labour Economics 11, 2, pp. 279-301.

HOLMLUND, B. and J. ZETTERBURG (1990), "Insider effects in wage determination: evidence from five countries", European Economic Review, 35, pp. 1009-1034.

HOLZER, H., L. KATZ and A. KRUEGER (1988), "Job queues and wages: new evidence on the minimum wage and inter-industry wage structure", NBER Working Paper 2561.

HOWELL, D. (1989), "Production technology and the interindustry wage structure", Industrial Relations, 28, 1, pp. 32-50.

IWATA, G. (1974), "Measurement of conjectural variations in oligopoly", Econometrica, 42, pp. 947-966.

JAKUBSON, G. (1991), "Estimation and testing of the union wage effect using panel data", Review of Economic Studies, 58 (5), pp. 971-992.

JUHN, C., K. MURPHY and B. PIERCE (1993), "Wage inequality and the rise in returns to skill", Quarterly Journal of Economics, 101, 3, pp. 410-442.

JUST, R. and W. CHERN (1980), "Tomatoes, technology and oligopoly", Bell Journal of Economics, 11, pp. 584-602.

KAPLINSKY, R. (1983), "Firm size and technical change in a dynamic context", Journal of Industrial Economics, 32, pp. 39-60.

KARIER, T. (1985), "Unions and monopoly power", Review of Economic Studies, 67, pp. 34-42.

KATZ, L. and L.H. SUMMERS (1989), "Industry rents: evidence and implications", Brookings Papers: Microeconomics, pp. 209-290.

KATZ, L. and A. KREUGER (1992), "The effects of minimum wages in the fast food industry", NBER Working Paper No. 3997.

KESSIDES, I. (986), "Advertising, sunk costs and barriers to entry", ***Review of Economics and Statistics, 68,*** pp. ***84-95.***

KESSIDES, I. (1989), "Towards a testable model of entry: a study of the US manufacturing industries", ***Economica, 57,*** pp. ***219-238.***

KRUEGER, A.B. and L.H. SUMMERS (1987), "Reflections on the inter-industry wage structure", in K. Lang and J.S. Leonard (see below).

KRUEGER, A.B. and L.H SUMMERS (1988), "Efficiency wages and the inter-industry wage sStructure", ***Econometrica,*** 56(2), pp. ***259-93.***

LANG, K. and J.S. LEONARD, (eds.) (1987), ***Unemployment and the structure of labour markets,*** Basil Blackwell, New York.

LAYARD, R. and S. NICKELL (1986), "Unemployment in Britain", ***Economica, 53, S121-S169.***

LAYARD, R., S. NICKELL and R. JACKMAN (1991), ***Unemployment,*** Oxford University Press, Oxford.

LEE, L-F. and R. PORTER (1984), "Switching regression models with imperfect sample separation information – with an application on cartel stability", ***Econometrica, 52,*** pp. ***391-418.***

LEONARD, J. (1987), "Carrots and sticks: pay, supervision and turnover", ***Journal of Labour Economics, 5, 4,*** S136-S152.

LEVIN, R., A. KLEVORICK, R. NELSON and S. WINTER (1987), "Appropriating the returns from industrial research and development", ***Brookings Papers on Economic Activity, 3,*** pp. ***783-831.***

LIEBERMAN, M. (1984), "The learning curve and pricing in the chemical processing industries", ***Rand journal of Economics,*** 15, pp. ***213-28.***

MACHIN, S.J. (1991), "Unions and the capture of economic rents: an investigation using British firm level data", ***international journal of Industrial Organisation, 9,*** pp. ***267-74.***

MACHIN, S.J. and A. MANNING (1992), "Testing dynamic models of worker effort", ***Journal of Labour Economics.***

MACHIN, S.J. and A. MANNING (1992), "Minimum wages, wage dispersion and employment: evidence from UK wages councils", Centre for Economic Performance DP No. ***80.***

MACHIN, S.J., A. MANNING and S. WOODLAND (1993), "Are workers paid their marginal product? Evidence from a low wage labour market", Centre for Economic Performance, mimeo.

MACHIN, S.J. and M.B. STEWART (1990), "Unions and the financial performance of British private sector establishments", ***journal of Applied Econometrics, 5,*** pp. ***327-50.***

MANNING, A. (1990), "imperfect competition, multiple equilibria and unemployment policy", ***Economic journal,*** 100, pp. 151-162.

MANNING, A. (1993), "Wage bargaining and the Philips curve: the identification and specification of aggregation wage equations", ***Economic Journal,*** 103, pp. ***98-119.***

MANSFIELD, E, M. SCHWARTZ and S. WAGNER (1981), "Imitation costs and patents: an empirical study", ***Economic Journal, 91,*** pp. ***903-918.***

MATA, J. (1991*a*), "Sunk costs and entry by small and large plants", in P. Geroski and J. Schwalbach (eds), Entry and Market Contestability: *An* International Comparison, Basil Blackwell, Oxford.

MENEZES-FILHO, N., D. ULPH and J. VAN REENEN (1995), "R&D and union bargaining: evidence from British companies and establishments", University College London Discussion Paper 95/11.

METCALF, D. (1993), "The economic effects of unions", Centre for Economic Performance Discussion Paper.

MILGROM, P. and J. ROBERTS (1982), "Limit pricing and entry under incomplete information: an equilibrium analysis", Econometrica, 50, pp. 443-459.

MODGLIANI, F. (1958), "New developments on the oligopoly fact", Journal *of* Political Economy, 66, pp. 215-32.

MORCH VAN DER FEHR, N. (1991), "Domestic entry in Norwegian manufacturing industries", in P. Geroski and J. Schwalbach, Entry and Market Contestability, Basil Blackwell, Oxford.

MUELLER, D. (1986), Profits in the Long Run, Cambridge University Press, Cambridge.

MUELLER, D. (ed.) (1990), The Dynamics *of* Company Profits, Cambridge University Press, Cambridge.

MURPHY, K.M and R.H. TOPEL (1987), "Unemployment, risk, and earnings: testing for equalising wage differences in the labour market", in K. Lang and J.S. Leonard.

NICKELL, S.J. and S. WADHWANI (1990), "Insider forces and wage determination", Economic *Journal,* 100, pp. 496-509.

NICKELL, S.J., J. VAINIOMAKI and S. WADHWANI (1992), "Wages, unions, insiders and product market power", CEP Discussion Paper.

ODAGIRI, H. and H. YAMAWAKI (1990), "Persistence of profits: international comparisons", in D. Mueller, Profits in the Long Run, CUP, Cambridge.

OECD (1985), *Costs* and Benefits *of* Protection, Paris.

PENCAVEL, J.H. (1972), "Wages, specific training and labour turnover in US manufacturing industries", *International* Economic Review, 13 (1).

PENCAVEL, J.H. (1991), Labour Markets Under Trade *Unionism,* Basil Blackwell, Cambridge, Massachusetts.

PORTER, R. (1983), "A study of cartel stability: the Joint Executive Committee, 1988-1886", Belljournal *of* Economics, 14, pp. 301-314.

PORTER, R. (1985), "On the incidence and duration of price wars", *Journal of* Industrial *Economics,* 33, pp. 415-426.

RIZZO, J. and R. ZECKHAUSER (1990), "Advertising and entry: the case of physicians services", *Journal of* Political Economy, 98, pp. 476-500.

ROBERTS, M. (1984), "Testing oligopolistic behaviour: an application of the variable profit function", *International* journal *of* Industrial *Organization,* 4, pp. 367-384.

SALOP, S. (1973), "Wage differentials in a dynamic theory of the firm", *journal of Economic Theory,* 6, pp. 321-344.

SALOP, S. (1979), "A model of the natural rate of unemployment", *American Economic Review,* 69, pp. 117-25.

SALOP, S. and D. SCHEFFMAN (1983), "Raising rivals costs", *American Economic Review,* 73, pp. 267-71.

SCHERER, F.M. and T. ROSS (1990), *Industrial Market Structure and Economic Performance,* Houghton Mifflin, Boston.

SCHMALENSEE, R. (1972), *The Economics* of *Advertising,* North Holland, Amsterdam.

SCHMALENSEE, R. (1978), "Entry deterrence in the ready-to-eat breakfast cereals industry", *Bell journal* of *Economics,* 9, pp. 305-327.

SCHMALENSEE, R. (1982), "Product differentiation advantages of pioneering brands", *American Economic Review,* 72, pp. 349-65.

SCHMALENSEE, R. (1989), "Inter-industry studies of structure and performance", in R. Schmalensee and R. WILLIG (eds), *Handbook* of *Industrial Economics,* North Holland, Amsterdam.

SCHWALBACH, J. (1991), "Entry, exit concentration and market contestability" in P. Geroski and J. Schwalbach, *Entry and Market Contestability,* Basil Blackwell, Oxford.

SHAPIRO, C. and J.E. STIGLITZ (1984), "Equilibrium unemployment as a worker discipline device", *American Economic Review,* 74(3), pp. 433-44.

SHAW, R. (1973), "Investment and competition from boom to recession: a case study in the process of competition – the dry cleaning industry", *journal* of *Industrial Economics,* 21, pp. 308-24.

SILVESTRE, J. (1993), "The market-power foundations of macroeconomic policy", *journal* of *Economic Literature,* 31, pp. 105-141.

SLADE, M. (1987), "Interfirm rivalry in a repeated game: an empirical test of tacit collusion", *journal* of *Industrial Economics,* 35, pp. 499-516.

SLICHTER, S. "Notes on the structure of wages", *Review* of *Economics and Statistics,* 32 (1), pp. 80-91.

SOSKICE, D. (1990), "Reinterpreting corporatism and explaining unemployment: co-ordinated and non-coordinated market economies", in R. Brunetta and C. Dell'Aringa (eds.), *Labour Relations and, Economic Performance,* McMillan.

SPENCE, M. (1977), "Entry, capacity, investment and oligopolistic pricing", *Bell journal* of *Economics, 8,* pp. 534-44.

SPILLER, D. and E. FAVARO (1984), "The effects of entry regulation on oligopolistic interaction: the Uruguayan banking sector", *Rand journal* of *Economics,* 15, pp. 244-54.

STEWART, M.B. (1987), "Collective bargaining agreements, closed shops and relative pay", *Economic journal,* 97(385), pp. 140-56.

STEWART, M.B. (1990), "Union wage differentials, product market influences and the division of rents", *Economic journal,* 100, pp. 1122-37.

SULLIVAN, D. (1989), "Monopsony power in the market for nurses", *Journal of Law and Economics, 32.*

SUMMER, D. (1981), "Measurement of monopoly behaviour: an application to the cigarette industry", *Journal of Political Economy, 89,* pp. 1010-1019.

SUTTON, J. (1991), *Sunk Costs and Market Structure,* MIT Press, London.

SVENJAR, J. (1986), "Bargaining power, fear of disagreement and wage settlements: theory and evidence from the US industry", *Econometrica,* 54(5), pp. 1055-78.

SZYMANSKI, S. and S. WILKINS (1993), "Cheap rubbish? Competitive tendering and contracting out in refuse collection 1981-88", *Fiscal Studies,* 14(3), pp. 109-30.

TILTON, J. (1971), *International Diffusion of Technology: The Case of Semi-Conductors,* Brookings Institution, Washington.

TIROLE, J. (1988), *The Theory of Industrial Organization,* MIT Press, Boston.

URBAN, G., T. CARTER, S. GASKIN and Z. MUCHA (1984), "Market share rewards to pioneering brands", *Management Science, 32,* pp. 645-59.

VAN REENEN, J. (1996), "The creation and capture of economic rents: wages and innovation in UK manufacturing plants", *Quarterly Journal of Economics,* pp. 195-226, February.

WADHWANI, S. and M. WALL, (1992), "A direct test of efficiency wage theory using UK micro data", *Oxford Economic Papers.*