DISCUSSION PAPERS

BARGAINING AND INCOME DISTRIBUTION
IN UK MANUFACTURING

Steve Dowrick
DISCUSSION PAPER NO. 174
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G.P.O. Box 4, Canberra 2601, Australia
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<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction/Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>1. Recent Changes in UK Income Distribution</td>
<td>2</td>
</tr>
<tr>
<td>3. Estimating Industry Wage Rents</td>
<td>17</td>
</tr>
<tr>
<td>Conclusions</td>
<td>32</td>
</tr>
<tr>
<td>Footnotes</td>
<td>34</td>
</tr>
<tr>
<td>References and Sources</td>
<td>38</td>
</tr>
<tr>
<td>Appendix A - Definitions of Variables</td>
<td>41</td>
</tr>
<tr>
<td>List of Discussion Papers - 1987</td>
<td>44</td>
</tr>
</tbody>
</table>
TABLES AND FIGURES

Table 1: UK Profitability 1960-85 ........................................... 3
Table 2: Growth in Productivity and Earnings 1965-84 .................. 6
Table 3: Manufacturing Price-Cost Margins 1970-84 .................... 8
Table 4: Estimating Inter-Industry Wage Differentials ................. 20
Table 5: Comparison of Cross-Section and Time-Series Estimates of the Effect of Unemployment on Manual Wages ....................... 22
Table 6: Testing the Impact of Wage Rents on Price-Cost Margins .... 27
Table 7: The Effects of (Unanticipated) Wage Inflation on Price-CostMargins .................................................. 28
Table 8: 1982 PCM Regressions: Controlling for Trade and Endogeneity .................................................. 30

Figure 1: The Ratio of Manual to Non-Manual Earnings in UK Manufacturing 1963-85 .................................................. 7
Figure 2: Bargaining on and off the Labour Demand Curve ........... 14
INTRODUCTION / EXECUTIVE SUMMARY

This paper draws attention to, and attempts to explain, a remarkable shift in the distribution of income which occurred in the early 1980s in both the manufacturing sector and the whole of the UK economy. During a recession, when we normally expect labour’s share in national income to be relatively high, profit share has risen to post-war record levels. The losers in the distribution stakes, apart of course from the unemployed, are seen to be manual workers, particularly the lower paid. Part 1 outlines the evidence on recent changes in UK wages and profitability in order to identify whether the fall in labour share can be attributed solely to industrial restructuring - but concludes that there is evidence of substantial weakening of the bargaining position of manual workers under the impact of mass unemployment.

The impact of wage pressure on price-cost margins is crucial in any investigation of the functional distribution of income. If margins are invariant to wage pressure, distribution will be largely determined by those product market factors which determine the mark-up and by substitution between factors of production; although real wage gains may be won in one sector at the expense of other sectors, aggregate wage pressure will tend to be translated into inflation if mark-ups are stable. So in Part 2 we review theory and evidence relating to the question whether wage pressure does affect price-cost margins and, if so, how?

Part 4 presents an econometric study of the manufacturing sector, asking why the reduction in the growth of manual workers’ real wages during the early 1980s was translated into higher profit margins rather than lower prices. (Alternatively, it can be viewed as an investigation of the reasons why the high rate of growth of manual wages in the early 1970s eroded profit margins.) Three competing hypotheses are examined through cross-sectional analysis of industry pricing and wages: (1) that rising profit margins are a consequence
solely of industrial restructuring and are independent of changes in labour strength; (2) that industrial pricing has a lagged response to wage changes; (3) that union-employer bargaining covers employment levels and thus constrains mark-up pricing. In order to test the latter hypothesis we need to construct estimates of the level of industry rents embodied in wages. The estimation of wage rents is described in Part 3 where we also assess the impact of unemployment on wage bargaining. The evidence supports the hypothesis that labour strength does affect margins, and that unions and employers do bargain over employment levels.

1. **RECENT CHANGES IN UK INCOME DISTRIBUTION**

The early 1980s have seen massive deflation and unemployment in the UK, particularly in the manufacturing sector where output (employment) fell by 15% (20%) between 1979 and 1982, recovering only by some 9% (falling a further 6%) by 1985. GDP fell 4% to 1981, recovering to the 1979 level only by 1984, whilst the unemployment rate rose from under 5% to over 11%. (Sources: Economic Trends, National Income and Expenditure, Monthly Digest of Statistics) During the latter period of mild recovery we have witnessed a dramatic rise in profitability and a shift in the distribution of income away from labour earnings. Table 1 shows that the share of company profits in GDP had risen by the beginning of 1985 to over 16%, nearly double the level of the mid 1970s, well above the levels of the 1960s, and higher even than the previous post-war record of 16% in 1955. The rise in the share of profits has come almost entirely at the expense of labour, for the share of the remaining categories of income (the surplus of public corporations and government, and income from rent and self-employment) has remained remarkably steady in the range of 18-21% throughout the post-war period. The figures for company profit shares in the beginning of 1985 are affected somewhat by the transfer of British Telecom to the private sector, but the share of labour in GDP is still lower than at any time since 1946.
# TABLE 1

**UK PROFITABILITY 1960 - 85**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>SHARES IN GDP</th>
<th>SHARE IN NDP</th>
<th>REAL RATE OF RETURN (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Earnings(1) %</td>
<td>Profits(2) %</td>
<td>Profits(3) %</td>
</tr>
<tr>
<td>1960-73 (av)</td>
<td>67.3</td>
<td>13.4</td>
<td>12.1</td>
</tr>
<tr>
<td>1974-79 (av)</td>
<td>69.3</td>
<td>10.5</td>
<td>8.0</td>
</tr>
<tr>
<td>1980-85 (av)</td>
<td>66.4</td>
<td>13.8</td>
<td>12.0</td>
</tr>
<tr>
<td>1974</td>
<td>70.2</td>
<td>8.9</td>
<td>7.3</td>
</tr>
<tr>
<td>1975</td>
<td>72.5</td>
<td>7.9</td>
<td>5.4</td>
</tr>
<tr>
<td>1976</td>
<td>70.8</td>
<td>8.4</td>
<td>5.8</td>
</tr>
<tr>
<td>1977</td>
<td>67.5</td>
<td>12.4</td>
<td>9.7</td>
</tr>
<tr>
<td>1978</td>
<td>67.0</td>
<td>13.0</td>
<td>10.4</td>
</tr>
<tr>
<td>1979</td>
<td>67.7</td>
<td>12.6</td>
<td>9.3</td>
</tr>
<tr>
<td>1980</td>
<td>69.0</td>
<td>11.8</td>
<td>8.8</td>
</tr>
<tr>
<td>1981</td>
<td>68.5</td>
<td>11.5</td>
<td>9.5</td>
</tr>
<tr>
<td>1982</td>
<td>66.6</td>
<td>12.8</td>
<td>10.8</td>
</tr>
<tr>
<td>1983</td>
<td>65.7</td>
<td>14.2</td>
<td>13.0</td>
</tr>
<tr>
<td>1984</td>
<td>64.9</td>
<td>16.0</td>
<td>14.9</td>
</tr>
<tr>
<td>1985</td>
<td>64.1</td>
<td>16.8</td>
<td>12.1</td>
</tr>
</tbody>
</table>

**Sources:**
- National Income and Expenditure 1985, Tables 3.5 and 5.4.

**Notes:**
1. Wages and salaries, forces' pay and employers' contributions.
2. Gross trading profits of companies, net of stock appreciation, including financial institutions.
3. Net trading profits and rent of industrial and commercial companies.
4. Net operating surplus on UK operations, before interest and tax, on net capital stock of fixed assets (excluding land) at current replacement cost plus book value of stocks.
5. Estimated from BEQB chart p.358, backward-looking measure.
At the same time as profit shares were rising, real rates of return on capital had risen by 1985 to ten-year record levels. These record profitability figures appear to represent more than just a reversal of the profits slump in the mid-1970s; the real rate of return for all companies has risen, since 1983, above the average return for the 1960s. Some of the rise in profitability is no doubt due to the high profits on North Sea oil operations, which by 1984 account for around one third of company profits. But even if a substantial proportion of North Sea earnings is put down to 'natural resource rent' rather than profits, it is evident that the share of (redefined) profits in GDP is still well above the levels of the 1970s, and probably still above the average level of the 1960s. Indeed, by 1985 the real rates of return on non-North Sea operations were above the levels of the 1970s, and just below or above the average of the 1960s depending on whether one considers pre-tax or post-tax rates of return.

Is the 1980s rise in real rates of return on non-oil activities due simply to a restructuring of UK industry towards more efficient, high profit activities, and the scrapping of the less profitable sectors? The Bank of England (Bank of England Quarterly Bulletin, September 1984, p.360-367) studied the performance of the large companies which account for 75% of aggregate capital employed in the UK. They break down the rise in non-oil real rates of return by 23 sectors and find that only in two sectors (office equipment and 'shipping and transport') did real rates of return fall over the period 1980-83. Their figures do include the overseas activities of UK companies, but they indicate nevertheless that profitability has risen in almost all sectors.

That the UK economy has undergone changes more profound than a simple restructuring of industry is evidenced further by the movement in labour shares and real wages. High profit industries tend to pay higher wages, so we would expect that a restructuring towards high profit activities would lead to higher wages without necessarily affecting income shares. However, in the 1980s the share of labour earnings has in fact
slumped\(^{(2)}\) as real wage growth has fallen substantially behind the growth of labour productivity.

Table 2 summarises growth in productivity and real wages between 1965 and 1984 in the whole economy (based on weekly data) and in manufacturing (based on hourly data). It is apparent that the product wage grew roughly in line with productivity up until 1973, but has since fallen behind productivity growth, particularly after 1979. Real earnings (deflated by consumer price indices rather than producer price indices) have also fallen substantially behind productivity growth since 1979. Here we see confirmation of the previously observed shift in the distribution of income from earnings to profits. Moreover, the move away from earnings has been substantial in the manufacturing sector, even if not as marked as in the total production sector (which includes oil). The rest of this paper concentrates on income distribution in manufacturing as this is a sector for which we can find matching data on wages, productivity and profitability.

A striking feature of the cut in labour earnings relative to productivity growth since 1979 is that the cut has been borne almost entirely by manual workers. Non-manual workers' product earnings have risen almost exactly in line with productivity. The disparity between manual and non-manual earnings growth is particularly apparent for hourly earnings in manufacturing. Between 1979 and 1984, hourly productivity rose by over 20%, and the non-manual hourly product wage rose 23% for males and 21% for females. But for manual male and female workers the hourly product wage rose only by 12% and 9% respectively - and their real hourly wage (relative to consumer prices) rose by only 4% and 2% over the five-year period. The decline in manual workers' relative earnings is most marked at the bottom end of the pay scale, for the gap between the lowest and highest paid manual (and non-manual) workers widened appreciably over the period 1977-84: for male (female) manual workers the ratio of the the lowest decile of earnings to the uppermost decile fell from 55% (55%) to 48% (52%). (Source: Annual Abstract of Statistics)
### TABLE 2
GROWTH IN PRODUCTIVITY AND EARNINGS 1965-84

<table>
<thead>
<tr>
<th>YEARS</th>
<th>PRODUCTIVITY(1)</th>
<th>AVERAGE EARNINGS(2)</th>
<th>MANUAL EARNINGS(3)</th>
<th>NON-MANUAL EARNINGS(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Product Wage(5)</td>
<td>Real Wage(6)</td>
<td>Real Wage(6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Male(7) Female(8)</td>
<td>Male(7) Female(8)</td>
</tr>
<tr>
<td>UK economy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965-69</td>
<td>2.8</td>
<td>3.4</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>1969-73</td>
<td>2.8</td>
<td>2.7</td>
<td>3.8</td>
<td>4.2</td>
</tr>
<tr>
<td>1973-79</td>
<td>1.1</td>
<td>0.4</td>
<td>0.5</td>
<td>1.1</td>
</tr>
<tr>
<td>1979-83/4</td>
<td>3.7</td>
<td>2.3</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965-69(av)</td>
<td>3.9</td>
<td>3.7</td>
<td>2.4</td>
<td>2.1</td>
</tr>
<tr>
<td>1969-73(av)</td>
<td>4.3</td>
<td>4.6</td>
<td>3.8</td>
<td>4.4</td>
</tr>
<tr>
<td>1973-79(av)</td>
<td>1.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>1979-84(av)</td>
<td>3.8</td>
<td>2.9</td>
<td>2.1</td>
<td>0.9</td>
</tr>
<tr>
<td>1974</td>
<td>0.6</td>
<td>-4.5</td>
<td>1.0</td>
<td>-1.8</td>
</tr>
<tr>
<td>1975</td>
<td>-1.9</td>
<td>3.4</td>
<td>2.4</td>
<td>4.0</td>
</tr>
<tr>
<td>1976</td>
<td>5.2</td>
<td>0.0</td>
<td>-0.3</td>
<td>2.5</td>
</tr>
<tr>
<td>1977</td>
<td>0.9</td>
<td>-6.7</td>
<td>-4.8</td>
<td>-6.8</td>
</tr>
<tr>
<td>1978</td>
<td>1.1</td>
<td>5.5</td>
<td>7.0</td>
<td>5.5</td>
</tr>
<tr>
<td>1979</td>
<td>0.6</td>
<td>3.5</td>
<td>1.2</td>
<td>3.8</td>
</tr>
<tr>
<td>1980</td>
<td>-1.3</td>
<td>2.5</td>
<td>-0.9</td>
<td>-1.4</td>
</tr>
<tr>
<td>1981</td>
<td>4.7</td>
<td>3.3</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>1982</td>
<td>5.1</td>
<td>3.2</td>
<td>2.4</td>
<td>0.6</td>
</tr>
<tr>
<td>1983</td>
<td>6.5</td>
<td>3.6</td>
<td>4.4</td>
<td>3.4</td>
</tr>
<tr>
<td>1984</td>
<td>4.0</td>
<td>2.0</td>
<td>3.5</td>
<td>1.8</td>
</tr>
<tr>
<td>1985</td>
<td>3.7</td>
<td>3.3</td>
<td>2.9</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**Notes:**
1. Output per person employed in whole economy 1965-79, in total production industries, 1979-84; per person hour (pre-1970, per person) in manufacturing.
2. Average earnings indices, average of April and October each year.
5. Deflated by GDP deflator or manufacturing producer price index for home sales.
6. Deflated by Retail Price Index.
7. Full-time men, 21 years and over.
8. Full-time women, 18 years and over.

**Sources:** Employment Gazette and Economic Trends.
The decline in the relative fortunes of manufacturing sector manual workers is highlighted by Figure 1 which shows the ratio of manual to non-manual earnings since 1963, both weekly and hourly, in manufacturing (following fairly closely the trends in the whole economy). By 1984, manual workers' earnings were further behind the earnings of their non-manual counterparts than at any time since 1963.

Now, a cut in real manual earnings relative to productivity could result in either a lower relative price for manufactured goods or a rise in profit margins. The evidence (Table 2) that productivity growth outstripped the rise in the average product wage (for both manuals and non-manuals) implies that manufacturing profits reaped the benefit of the cut in manual earnings. This conclusion is supported by data from the Census of Production -
available only up to 1982 - which does show a significant rise in profit margins. Table 3 lists manufacturing price-cost margins defined alternately on gross and net revenues and with

TABLE 3
MANUFACTURING PRICE-COST MARGINS 1970-84

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 (1)</td>
<td>0.256</td>
<td>0.183</td>
<td>0.621</td>
<td>0.443</td>
</tr>
<tr>
<td>1971 (1)</td>
<td>0.259</td>
<td>0.181</td>
<td>0.620</td>
<td>0.434</td>
</tr>
<tr>
<td>1972 (1)</td>
<td>0.274</td>
<td>0.197</td>
<td>0.633</td>
<td>0.455</td>
</tr>
<tr>
<td>1973</td>
<td>0.271</td>
<td>0.199</td>
<td>0.633</td>
<td>0.463</td>
</tr>
<tr>
<td>1974</td>
<td>0.267</td>
<td>0.194</td>
<td>0.642</td>
<td>0.467</td>
</tr>
<tr>
<td>1975</td>
<td>0.250</td>
<td>0.170</td>
<td>0.607</td>
<td>0.412</td>
</tr>
<tr>
<td>1976</td>
<td>0.257</td>
<td>0.182</td>
<td>0.625</td>
<td>0.444</td>
</tr>
<tr>
<td>1977</td>
<td>0.254</td>
<td>0.181</td>
<td>0.636</td>
<td>0.453</td>
</tr>
<tr>
<td>1978</td>
<td>0.262</td>
<td>0.185</td>
<td>0.637</td>
<td>0.449</td>
</tr>
<tr>
<td>1979</td>
<td>0.263</td>
<td>0.264</td>
<td>0.183 0.181</td>
<td>0.639 0.640</td>
</tr>
<tr>
<td>1980</td>
<td>0.261</td>
<td>0.172</td>
<td>0.625</td>
<td>0.413</td>
</tr>
<tr>
<td>1981</td>
<td>0.276</td>
<td>0.183</td>
<td>0.646</td>
<td>0.429</td>
</tr>
<tr>
<td>1982</td>
<td>0.281</td>
<td>0.192</td>
<td>0.661</td>
<td>0.450</td>
</tr>
<tr>
<td>1983 (2)</td>
<td>0.285</td>
<td>0.198</td>
<td>0.671</td>
<td>0.466</td>
</tr>
<tr>
<td>1984 (2)</td>
<td>0.288</td>
<td>0.202</td>
<td>0.677</td>
<td>0.477</td>
</tr>
</tbody>
</table>

Definitions:
P = profit = value added - wages - salaries - employers' N.I.
P = over head costs = non-industrial costs.
S = salaries = salaries of non-manual employees + (est.) N.I.

Notes:
1. Assuming 10% employers’ national insurance on wages and salaries.
2. 1983 and 1984 estimates - see text - based on rise in productivity compared with rise in earnings.

Source: Census of Production, annual summary tables, 1970-82.
salaries treated alternately as fixed and variable costs. I also give estimates for 1983 and 1984 based on the rise in productivity in these years ahead of the growth in the product wage (a gap of 3% and 2% respectively), making the assumption that the ratio of materials costs to revenue remained the same as in 1982. It is evident that although the recession of the early 1980s was deeper than that of the mid 1970s, manufacturing profit margins did not fall so far, and they recovered by 1982 to levels above the late 1970s. The estimated profit margins for 1983 and 1984 are well above those even of the peak years in 1972 or 1973.(4)

There is a striking coincidence between the rise in manufacturing profitability and profit margins in the 1980s, the massive increase in UK unemployment, and the decline in the earnings of manual workers relative both to productivity and to non-manual earnings. Here is a prima facie case that mass unemployment had the effect of so weakening the bargaining position of manual workers as to allow profit margins and profitability to rise substantially for those firms which survived the recession. This "reserve army of labour" argument incorporates two hypotheses concerning labour and product market behaviour: that unemployment should undermine workers' bargaining strength and that profit margins should reflect the balance of bargaining power.

An obvious implication of the reserve army argument is that real wages should rise in booms and fall in slumps. Schor (1985) surveys the literature on cyclical variation in real wages, reporting mixed evidence with a tendency to find pro-cyclical patterns prior to the 1970s. Her own study of 9 OECD countries concludes that there were strong pro-cyclical movements in real wages in the period 1955-70, but that the pro-cyclical effect diminished in the 1970s. Two recent studies of UK real earnings by Foster, Henry and Trinder (1984) and by Layard and Nickell (1985) include the deep recession of the early 1980s in their data sets, and they each find that unemployment does significantly reduce manual real wages. These studies do suggest that even if the 'reserve army' effect was dormant in the 1970s, it was
resurrected with the onset of mass unemployment in the 1980s.\(^5\) It is not clear whether it is primarily the level of unemployment or its rate of increase which undermines workers' real wage bargaining.

We cannot, however, explain changes in labour's share purely through labour market effects unless changes in bargaining strength are reflected in industry profit margins. Otherwise, if margins were invariant to labour strength, employers would simply pass on wage changes into higher or lower prices leaving the functional distribution of income largely unchanged.\(^6\) At its simplest, the argument here is that income distribution (and aggregate real wages for a given level of productivity) are determined, at least proximately, by the mark-up of price on wage costs. If the mark-up is stable, so too is the functional distribution of income. However, the broad picture of the UK economy in the 1980s poses the questions whether and why margins may have widened in response to the weakness of manual labour.\(^7\)

Of course, average price-cost margins may have risen in response to industrial restructuring (in favour of higher profit industries) and / or in response to changing product market conditions rather than in response to labour market changes. For instance, Cowling (1983) argues that excess capacity will rise in a recession, increasing firms' actual and perceived ability to retaliate against price-cutting rivals, allowing an oligopoly group to maintain a higher mark-up after, perhaps, an initial price-war. However, we would expect such an effect to have diminished by 1983/4 as redundant plants were scrapped and output began slowly to rise from the depths of the recession. Another factor which may have allowed manufacturing margins to widen is the decline in the real exchange rate (and, therefore, the pressure of foreign competition) from its 1980 peak. However, even by 1984 the real UK/US exchange rate\(^8\) was not significantly below the 1970-76 average level; so the explanation of the secular rise in margins does not appear to lie here.
The rest of the paper aims to clarify and test through cross-sectional analysis the extent to which, and the reasons why, labour strength may have affected UK manufacturing profit margins (and, thus, income distribution). In the process, the impact of unemployment on labour strength will be examined. The focus of the study is the question whether and why the reduction in manual workers’ relative pay in the 1980s appears to have been reflected in rising profit margins rather than in lower prices. If we find that high margins are uncorrelated with weakened wage pressure, we may conclude that it is industrial restructuring which underlies the resurgence of profitability.

2. Can Labour Strength Affect Oligopolistic Price-Cost Margins?

Coutts et al. (1978) and Sawyer (1983) present time-series econometric evidence of the stability of the price-cost mark-up in UK manufacturing in the face of changes in demand pressure and foreign competition. Cross-section studies of the determination of industry mark-ups are reported by, amongst many others, Cowling and Waterson (1976), Hay and Morris (1979) and Turner (1980), who in general find support for models of oligopolistic pricing.

Sawyer’s (1983) study finds that cost changes tend to be marked up with a lag of 2 to 4 quarters. Slow price adjustment implies that higher rates of wage growth will tend to erode margins. So the slowdown in the rate of wage and price inflation in the 1980s might account for the rise in manufacturing margins (as long as the lag is invariant to the inflation rate). If this is so, we should be able to find evidence in cross-section studies that wage inflation affects price-cost margins: an industry experiencing relatively high wage growth should have a relatively low profit margin. This simple hypothesis will be tested on a cross-section of UK manufacturing industries. I note, however, Sawyer’s unexplained evidence (Sawyer, 1983, p.72) that rises in labour costs (rather than fuel, materials, components etc. which
contribute on average some 80% of variable costs at plant level) are not marked up at all. A possible explanation for this surprising result might be that employers anticipate wage bargaining in progress, raising prices in advance of wage increases. If pricing were to anticipate wage movements we might expect to find a positive rather than negative effect of wage growth on margins (but this would not explain the secular rise in margins during a period of falling inflation).

An alternative explanation for the erosion of oligopolistic profit margins by labour strength emerges from the hypothesis of "efficient bargaining" (see McDonald and Solow, 1981; Svejnar, 1982). The underlying premise is that a union which is bargaining with an employer has a preference for higher employment as well as for higher wages. The standard treatment of union bargaining assumes that a wage bargain is struck first, then employment is set by the employer to maximise profit (utility) given the bargained wage. In this case we can speak of the bargain as lying on the employers' labour demand curve (LDC in Figure 2). However, as long as the union sets some value on increasing employment it is possible to define a pareto-improving bargain which trades off higher employment for lower wages to make both union and employer better off. The set of pareto efficient contracts is the contract curve C'C.

If a bargain is made off rather than on the labour demand curve we expect that the profit margin will be lowered: the bargain constrains the employer from passing higher wages into higher prices, since a price rise would imply lower sales and, therefore, lower employment (n.b. although efficient bargaining generally implies lower margins, absolute profit levels might well rise with lower wage costs and higher output).

A common model of bargaining over wages and employment defines an employers' profit function as:
\[ p(L, w) = R(L) - wL - F \]
\[ R'(L) > 0, \quad R''(L) < 0 \]  

where \( w \) is the wage and \( L \) the level of employment and \( F \) is fixed (overhead) costs. Revenue, \( R(\cdot) \), is taken to be a function of employment on the underlying assumption that labour is the only variable input (this analysis is relevant only to short-run wage/employment decisions) and that the employer faces a (down-sloping) demand function where price is a function of output alone.

Union preferences over wages and jobs are captured by a utility function:

\[ V(w, L) = L[u(w) - u(\bar{w})] \]  

where the alternative wage facing union members is \( \bar{w} \) and the function \( u(\cdot) \) can be thought of as capturing the ex-ante attitude to risk of a typical worker facing the threat of random lay-offs (see Oswald, 1982). We can define the relative risk aversion of the incremental utility function as:

\[ r = -\frac{u''(w)}{u'(w)} \cdot \frac{w - \bar{w}}{w} \]  

If workers are risk-averse (\( 1 > r > 0 \), the union's indifference curves in \( w, L \) space are steep, indicating that the union is prepared to accept a relatively large wage reduction in order to achieve a given increase in employment. In this case, the contract curve slopes forward - e.g. line \( CC' \) in Figure 2. If workers are risk-neutral (\( r = 0 \)), then the union aims simply to maximise wage rents \( L(w - \bar{w}) \), and the contract curve is vertical (\( CC' \)). Risk-loving (\( r < 0 \)) implies flat indifference curves as the union will trade-off only a
small wage cut to gain a given increase in employment, in which case the contract curve slopes downwards (e.g., C'C).

**Figure 2: Bargaining On and Off the Labour Demand Curve**

LDC = labour demand curve

CC = various possible contract curves

B = various possible bargains (shown at the same wage W for illustrative purposes only).

The equation of the contract curve is given by:

\[ w - R(L) = \frac{u(W) - u(W)}{u'(W)} \]

(See McDonald and Solow, 1981, for the results up to this point).

If we assume that relative risk aversion is constant, then we can rewrite the contract curve equation as:

\[ w - R'(L) = \frac{w - \bar{w}}{1 - \tau} \]

\[ (4) \]
The extent to which the bargained wage \( w \) exceeds the marginal revenue of labour \( R(L) \) measures how far the efficient bargain lies off the labour demand curve (the distance \( B'E \)). This distance is positively related to the degree of relative risk aversion and to the extent to which the wage has been raised above the alternative wage. If workers are risk averse, they are prepared to bargain for higher employment a long way off the contract curve (e.g. at point \( B'' \)). If they are risk-loving and the contract curve slopes downwards, the bargain they strike will be relatively close to the labour demand curve.

Now I will assume that if industry \( i \) is faced with an exogenous wage and employers unilaterally set output/price and employment to maximise (conjectured) profits, then the industry profit margin \( m_i \) will be determined by industry structure and product market conditions captured by a vector of variables \( X_i \) (industry concentration, product differentiation, etc.):

\[
m_i = m(X_i) \tag{5}
\]

This is the profit margin which we would observe if the bargain between union and employer was set on the labour demand curve (e.g. point \( E \) in Figure 2). However, if bargaining is efficient, e.g. at point \( B'' \), the employers' costs will be greater than costs at \( E \) by the amount \( L(w - R'(L)) \). We can deduce, therefore, that the price-cost margin under efficient bargaining \( (m_i^e) \) will be:

\[
m_i^e = m(X_i) - \frac{L(w - R'(L))}{R(L)}
\]

Substituting in (4) we derive:
\[ m_i^w = m(X_i) \cdot \frac{1}{1 - r_i} \cdot \frac{\text{wage rents}_i}{\text{revenue}_i} \] (6)

where wage rents are defined as that portion of the industry wage bill which is attributable to wages above the level of the alternative wage. These results simply tell us that the degree to which union bargaining strength (proxied here by the share of wage rents in revenue) erodes employers' profit margins depends firstly on the union being able to bargain over employment, and secondly on their degree of risk aversion, that is to say on the extent to which bargains deviate from the labour demand curve.

There is econometric evidence from the US which supports the hypothesis that union-employer bargaining does cover employment (MacCurdy and Pencavel, 1986; Svejnar, 1986; Clark, 1984). Oswald (1984) reports survey evidence that most US and UK employers do not bargain explicitly over jobs, but his evidence does not discount implicit job-bargaining, nor does it account for the incidence of UK industrial disputes over redundancies as exemplified by the 1984 miners' strike. The question of whether or not UK unions and employers do bargain over jobs is open to testing.

We have now two alternative explanations of how wage pressure might alter industry profit margins and income distribution. On the one hand, if mark-up pricing reacts slowly to (anticipates) wage increases we predict that high rates of wage growth should erode (increase) profit margins. On the other hand, to the extent that bargaining covers employment as well as wages, and to the extent that employment is important to unions, we predict that profit margins should be eroded by the level of wage rents rather than by wage inflation. If bargaining covers the wage alone, and if wage rises are marked up instantly, then wage pressure should not directly affect margins at all - any changes in aggregate profit margins may be due to product market conditions and/or to industrial restructuring. Section 5 presents
an empirical study of UK manufacturing price-cost margins which aims to test these hypotheses. Section 4 explains how measures of wage rents are derived.

3. ESTIMATING INDUSTRY WAGE RENTS

The aim of this part of the study is to correct observed inter-industry wage differentials for variations in the alternative wage, and then to take the residual variation as a measure of wage rents. The estimating procedure assumes that the bargained wage premium is independent of the variables which determine the alternative wage. Unfortunately there is no established specification of the determination of bargained wage premia, but I examine several ad-hoc specifications in order to assess whether the assumption of independence from the alternative wage is reasonable.

I take the observed wage \( w_i \) to be the sum of the alternative wage \( \bar{w}_i \), which workers in that industry could expect to earn elsewhere, and a bargained wage premium, \( WP_i \):

\[
W_i = \bar{w}_i + WP_i
\]  

(7)

The alternative wage is approximated by a linear function of variables \( Y_i \), with a normally distributed homoskedastic random error term, and workers’ relative bargaining strength (as proxied by the ratio of wage rents to profits \( P \)) is taken to be a linear function of bargaining variables \( Z_i \):

\[
\bar{w}_i = c_i Y_i + e_i
\]  

(8a)

\[
\left[ \frac{L \cdot WP}{\Pi} \right]_i = g Z_i + e'_i
\]  

(8b)

Studies of wage differentials tend not to make clear the crucial distinction (as implied
by models of bargaining) between those factors which affect the alternative wage - the baseline position from which workers bargain - and those factors which influence bargained wage premia. The alternative wage (adjusted for overtime and working conditions) should be affected primarily by those characteristics which workers can expect to take to, or find in, alternative employment - e.g. skill levels and local labour market conditions. On the other hand, industry specific characteristics such as unionisation and profitability should be amongst the determining influences on wage bargaining. Moreover, explicit bargaining models such as the Nash cooperative bargain predict that wage premia will depend on the interaction of bargaining strength and economic surplus; for if the employer is earning no surplus, workers will not be able to push up the wage without bankrupting the employer, however great their bargaining strength. This implies that variables which determine bargaining strength should be weighted by some measure of the economic surplus over which bargaining occurs, as in (8b). Accordingly, I estimate two linear versions of an inter-industry wage equation derived from (7) and (8):

\[
W_i = c_Y Y_i + e_i + WP_i = c_Y Y_i + e_i \\
W_i = a_Y Y_i + g(Z_i \Pi_i L_i) + e_i + c \Pi_i L_i_i
\]  

Specification a. omits the bargaining variables, making an assumption that wage premia are uncorrelated with the determinants of the alternative wage; b. includes bargaining variables weighted by profits per worker. The first specification is estimated by OLS. Specification b. predicts a heteroskedastic error term, so it is estimated by weighted least squares. The weights are a linear function of profit per worker and correct choice of weights yields maximum likelihood estimates. The regression results are reported in Table 4. (An alternative log-linear specification of 9a yields almost identical results and the White heteroscedasticity-consistent t-statistics are very close to those reported here).
I report cross-section regressions for each of 3 years: 1975, 1979 and 1983. The dependent variable is average weekly earnings for male manual workers. The sample is composed of those three digit manufacturing industries where matching data is available on product and labour market characteristics, excluding the miscellaneous categories, mineral oil refining and steel and shipbuilding. Three industries which reported negative gross profits (photographic, artificial fibres and clocks) are also omitted for some years. A correction for overtime hours is included in the estimating equation in the form of the variable OVERP, the coefficient on which estimates the average overtime premium. For 1983, the dependent variable has been adjusted for overtime at an assumed premium of 0.5.\(^{(12)}\)

Variations in the alternative wage are explained by the following variables: the concentration of the workforce in the standard regions of East Midlands, North West and South East\(^{(13)}\); the proportion of the male manual workforce with less than five years service; the industry average age; further education experience; training requirements; shift-working; and the extent of payment-by-result schemes.\(^{(14)}\) The training and education data is available only for 1975. I assume these variables are unchanged in 1979, but have had to omit them from the 1983 regressions (which are broken down by the 1980 rather than 1968 SIC). The estimated coefficients accord in sign with expectations, are statistically significant, and are robust to the inclusion of the bargaining variables.

Variations in the bargained wage premia are explained by the following variables (all weighted by profits per worker): plant size; the ratio of staff to operatives; the proportion of female employment; the industry unemployment rate; the growth of the industry; the five-firm concentration ratio; union coverage; a measure of capital stock. (The union and concentration variables are not available for 1983. The union and growth variables were omitted from the final 1979 specification, and the growth variable from the 1983 specification, as they were not statistically significant at the 20% level. All variables are
## TABLE 4

**ESTIMATING INTER-INDUSTRY WAGE DIFFERENTIALS**

The dependent variable is the industry average of hourly earnings for male manual workers. The explanatory variables are grouped in to those which are hypothesised to determine the alternative wage and those which determine bargained wage premia. The bargaining variables (Capital Intensity - Unionisation) are weighted by profits per worker (P1).

Estimated coefficients are followed by *t*-statistics in brackets. The Weighted Least Squares statistics are based on the weighted residuals.

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimation</th>
<th>1975</th>
<th>1979</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WLS$^1$</td>
<td>OLS</td>
<td>WLS$^1$</td>
</tr>
<tr>
<td>Mean wage</td>
<td>133.0</td>
<td>131.1</td>
<td>210.8</td>
<td>216.1</td>
</tr>
<tr>
<td>Further education</td>
<td>28 (1.91)</td>
<td>21 (1.59)</td>
<td>31 (2.45)</td>
<td>35 (1.91)</td>
</tr>
<tr>
<td>East Midlands</td>
<td>-22 (1.91)</td>
<td>-19 (1.73)</td>
<td>-36 (2.14)</td>
<td>-24 (1.53)</td>
</tr>
<tr>
<td>North West</td>
<td>-21 (2.06)</td>
<td>-15 (1.55)</td>
<td>-34 (2.30)</td>
<td>-24 (1.72)</td>
</tr>
<tr>
<td>South East</td>
<td>1.0 (2.02)</td>
<td>0.55 (1.09)</td>
<td>-1.31 (4.70)</td>
<td>-1.22 (4.50)</td>
</tr>
<tr>
<td>Average age</td>
<td>38 (2.72)</td>
<td>31 (2.09)</td>
<td>39 (1.89)</td>
<td>25 (1.15)</td>
</tr>
<tr>
<td>0.5 years experience</td>
<td>0.53 (2.51)</td>
<td>0.15 (0.23)</td>
<td>0.7 (3.60)</td>
<td>0.6 (2.73)</td>
</tr>
<tr>
<td>Training required</td>
<td>3.3 (4.48)</td>
<td>2.7 (3.06)</td>
<td>3.3 (3.71)</td>
<td>3.1 (3.71)</td>
</tr>
<tr>
<td>Overtime</td>
<td>0.39 (2.15)</td>
<td>0.40 (1.38)</td>
<td>0.72 (1.96)</td>
<td>0.47 (1.36)</td>
</tr>
<tr>
<td>CAPITAL INTENSITY</td>
<td>-3.2 (4.46)</td>
<td>-4.8 (2.93)</td>
<td>-3.9 (1.44)</td>
<td></td>
</tr>
<tr>
<td>PLANT SIZE</td>
<td>0.81 (1.11)</td>
<td>1.5 (3.68)</td>
<td>1.5 (3.71)</td>
<td></td>
</tr>
<tr>
<td>STAFF RATIO</td>
<td>-2.9 (1.90)</td>
<td>-3.4 (2.65)</td>
<td>-2.3 (2.00)</td>
<td></td>
</tr>
<tr>
<td>FEMALE RATIO</td>
<td>-7.6 (2.11)</td>
<td>-7.0 (3.39)</td>
<td>-10 (2.62)</td>
<td></td>
</tr>
<tr>
<td>UNEMPLOYMENT RATE</td>
<td>-0.15 (0.77)</td>
<td>-0.12 (1.16)</td>
<td>-0.15 (2.15)</td>
<td></td>
</tr>
<tr>
<td>GROWTH</td>
<td>1.75 (0.36)</td>
<td>1.47 (0.39)</td>
<td>1.30 (0.73)</td>
<td></td>
</tr>
<tr>
<td>CONCENTRATION</td>
<td>3.0 (0.13)</td>
<td>2.8 (1.73)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNIONISATION</td>
<td>1.7 (0.39)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N</th>
<th>R²</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>0.480</td>
<td>0.390</td>
</tr>
<tr>
<td>103</td>
<td>0.540</td>
<td>0.440</td>
</tr>
<tr>
<td>106</td>
<td>0.519</td>
<td>0.479</td>
</tr>
<tr>
<td>102</td>
<td>0.601</td>
<td>0.536</td>
</tr>
<tr>
<td>88</td>
<td>0.298</td>
<td>0.282</td>
</tr>
<tr>
<td>88</td>
<td>0.447</td>
<td>0.391</td>
</tr>
</tbody>
</table>

### NOTES TO TABLE 4

1. The bargaining specification is estimated by Weighted Least Squares. The weights are of the form $Q_i = (1 + P_i^k)$ where $P_i$ is profit per head in industry $i$ (measured in thousands of pounds per year) and the parameter $k$ is estimated to give a maximum likelihood estimate (see footnote 11) of 55 for 1979 and 140 for 1983. For 1973, the ML function does not reach an interior maximum, so a value for $k$ of 30 is imposed.

2. For 1983, the dependent variable has been adjusted for overtime at a rate of 0.5.
described in Appendix A.) The bargaining variables have estimated coefficients which are consistent in sign and order of magnitude across the three years, and are generally significant in a statistical sense in the 1979 and 1983 regressions (the large standard errors in the 1975 regression may be the result of distortions to bargaining due to abnormally low profitability). Although this specification of bargaining is clearly ad hoc and capable of refinement, the important point for our purposes is to note that the exclusion of bargaining variables does not distort significantly our estimates of the determinants of the alternative wage. Accordingly, I take the residuals from the regressions of specification a as estimates of the variation in bargained wage premia, assuming that once we have corrected for differences in regional composition, overtime, skill levels, etc. the remaining differences in observed wage levels are due to bargaining plus some random error term.

It is of particular interest to examine the estimated impact of unemployment levels on wages. Table 5 presents the estimated effect of a 1% point rise in unemployment on wages, although I note that the concept of industry-level unemployment is somewhat unclear - the measure is based on the number of registered unemployed who last worked in a particular industry and may thus pick up the recent rate of loss of jobs as much as the pressure of those seeking work in that industry. Nevertheless, our results do confirm the US findings of Svejnar (1986) that unemployment does depress union bargaining power. These estimates are compared with estimates derived by Layard and Nickell (1985) in the very different context of their 3-equation time series analysis of aggregate employment and real wages in the UK over the period 1954-83. The cross-section estimates of the impact of unemployment are very similar to Layard and Nickell's estimate for 1982 (and are lower for the earlier years). Taking the 1982 estimates we can calculate that the rise in the average rate of unemployment in manufacturing industries from 7% in 1979 to 15% in 1982 is predicted to have reduced the bargained wage by some 3.2% from the level it would otherwise have reached. This corresponds to roughly half of the contemporaneous fall in manual wages
relative to non-manual earnings or productivity growth.

TABLE 5

COMPARISON OF CROSS-SECTION AND TIME-SERIES ESTIMATES OF THE EFFECT OF UNEMPLOYMENT ON MANUAL WAGES

Estimates of the percentage change in the wage resulting from a rise in the unemployment rate of one percentage point.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>cross-section bargaining wage equation</th>
<th>time-series Layard and Nickell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>-0.4%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>1979</td>
<td>-0.4%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>1982</td>
<td>-0.3%</td>
<td>-0.4%</td>
</tr>
</tbody>
</table>

Notes:
1. From Table 4 specification b, multiplying the coefficients by average industry profits per worker.
2. From Layard and Nickell (1985, p.75, Table 4), model no. 1, non-linear estimate 3SLS: the elasticity of the real wage of male manual workers with respect to the unemployment rate = -0.07; the estimate here is calculated using the average unemployment rate of the sample of industries as the baseline for each year.

4. ESTIMATING THE IMPACT OF WAGE PREMIA AND WAGE INFLATION ON INDUSTRY MARGINS

Given the estimates of bargained wage premia which we derived in the previous section, we are in a position to test whether either wage-and-employment bargaining or lagged reaction to wage changes allow workers' bargaining strength to erode profit margins. In the former case, we expect margins to be negatively correlated with wage rents; in the latter case we expect the rate of wage inflation to erode margins.
Following result (6), I assume that the risk aversion parameter $r$ is constant across industries (whilst noting the reservations about such an assumption as argued by Geroski and Stewart, 1986, which imply that statistical inference from such aggregated analysis must be treated with caution). I test for the importance of jobs in bargaining by estimating a cross-section linear equation for each of 1975, 1979 and 1982:

$$ PCM_i = aX_i + d(\text{wage rents/revenue})_i + e_i $$

(10)

We would expect the coefficient $d$ to be less than zero to the extent that job levels are important in bargaining. The variables are defined in Appendix A. The sample is of 3 digit manufacturing industries, excluding nationalised industries and miscellaneous categories - giving a sample size of 103 industries for 1975 and 1979, and 89 industries for 1982 (the latest year for which data was available).

The explanatory variables $X$ stand as proxy for the industry structure parameters which determine the degree of monopoly in each industry. The variables used here are industry concentration, advertising intensity and demand growth each of which is expected to have a positive impact on margins. Concentration is predicted to be a direct determinant of margins in many oligopoly models. Advertising levels are taken as a proxy for product differentiations\(^{(15)}\) (see, for example, Clarke, Davies and Waterson, 1984). Growth of demand is included as another proxy for price elasticity, on the assumption that demand will be relatively less elastic if demand grows faster (or, in the context of this study, if it falls more slowly). Hay and Morris (1979, p.213) claim that: "there is no theoretical agreement on this variable, apart from general agreement that it is likely to be of some importance". Comanor and Wilson (1967) find that the correlation is typically positive, as do Hart and Morgan (1977) in their survey of work in this field and in their own study. I also test for the impact of capital intensity and plant size as barriers to entry.\(^{(16)}\)
The measure of wage rents is taken from the wage regressions reported in Table 4, treating all the variation in industry wage levels which is not accounted for by variations in the alternative wage (explained by skills, regions, etc.) as due to variation in bargained wage premia. These variations are captured by the residuals to the wage regressions in specification a. For each year we can identify a group of up to twelve industries which are paying the lowest wage premia - a group dominated by the declining and low-paying textiles, leather and clothing industries. I take this group to be paying their workers only the alternative wage and measure the wage premia in other industries relative to this group. The 1982 wage premia are assumed to be the same proportion of earnings as the 1983 estimates (1983 is the first year for which the relevant labour force and earnings data was broken down by the 1980 SIC).

The definition of the dependent variable, the price-cost margin, is problematic in various ways. Theoretical models of oligopoly pricing tend to suggest that the margin should be defined relative to marginal costs, although most research in this field uses some measure of average variable costs. This distinction disappears, however, if industries are operating below full capacity with constant marginal costs, a case which Cowling (1983) argues is applicable to UK manufacturing in the 1970s and a case which receives support from the evidence of Sawyer (1983) and Clarke, Davies and Waterston (1984). Moreover, the effect of any systematic economies or diseconomies of scale should be picked up by the explanatory variable measuring growth. A second definitional problem is whether to treat salaries of non-operative staff as fixed costs (e.g. Cowling, 1983) or as variable costs. We might expect to find indivisibilities in the costs of employing senior managerial and technical staff, but the data does not allow us to subdivide salary costs. A third problem in defining margins is to choose between gross and net measures of revenue. For instance, Hart and Morgan (1977, p.188) prefer the net measure on the grounds that the use of gross output or sales
brings in the spurious influence of "prices of raw materials, duties, subsidies and changes in the amount of work given to other establishments." On the other hand, conjectural variation equilibrium models of oligopoly do predict that sales (or gross output, the two measures are usually very close) is the correct measure of revenue. However, such models ignore the existence of vertical links between industries and the consequent possibility of bilateral bargaining. If vertical integration is prevalent, there will be a substantial intra-firm component to inter-industry trade and it may well be that firms operate and interact in terms of net rather than gross output. Cowling (1983) makes a similar point with regard to intra-industry inter-establishment transactions.

Since the appropriate definitions of fixed costs and revenue are disputed, I test four alternative measures of industry price-cost margins, measuring the ratio of overhead costs plus profits to revenue, as follows:(18)

\[
\begin{align*}
\text{PCM1} & = \frac{\text{net output} - \text{wages} - \text{N.I.}}{\text{gross output}} \\
\text{PCM2} & = \frac{\text{net output} - \text{wages} - \text{salaries} - \text{N.I.}}{\text{gross output}} \\
\text{PCM3} & = \frac{\text{net output} - \text{wages} - \text{N.I.}}{\text{net output}} \\
\text{PCM4} & = \frac{\text{net output} - \text{wages} - \text{salaries} - \text{N.I.}}{\text{net output}}.
\end{align*}
\]

The results of OLS regressions of equation (10) are given in Table 6, testing a variety of specifications and controlling for potential heteroscedasticity. When the gross definition of revenue is used, the explanatory power of the regressions is low (explaining less than 20% of the variation in margins) and the regressions are not statistically significant at the 1% level on an F-test (except specification PCM2 1982). However, when revenues are measured net of material costs (PCM3 and 4) the various specifications explain up to 50% of the observed variation in margins, significant at the 1% level in all cases. I take this evidence as support for the argument that net revenue is a better measure for cross-section comparison than gross
revenue since it is not affected to the same extent by variation in vertical integration. Accordingly, I concentrate the analysis on the PCM3 and PCM 4 results.

Concentration, advertising and growth have positive coefficients as expected. However, the plant-size and capital stock measures (proxying possible barriers to entry) attract unexpected negative coefficients, statistically insignificant at even the 10% level except in one instance (reported here only for PCM3). This evidence does not support the disputed hypothesis that these barriers to entry raise price-cost margins. So the preferred specifications a. exclude these measures of entry barriers (although they are used later on in instrumental variable estimation).

For each year, the coefficient on wage- rents is significantly less than zero (at the 1% level on a t-test) - implying that bargaining does cover employment levels as well as wages. Moreover, most of the coefficients are not significantly different from minus one. This evidence gives clear support to the hypothesis of efficient bargaining between rent-maximising unions and profit-maximising employers. Bargained wage premia appear to be deducted directly from profit margins, rather than being marked-up. Employers set prices as if they faced the exogenous alternative wage.¹⁹

Another explanation of the empirical results could, however, be simply that prices adjust slowly to wage rises, so that at any one time margins will tend to be lower in those industries where workers have recently won relatively large wage rises. I test for the effect of wage inflation on margins, adopting an underlying hypothesis that employers set prices assuming that they will have to concede the average nominal pay rise for the year - in which case any wage rise above the average will erode margins. If unanticipated wage rises are not passed on into price rises, we would expect a coefficient of -1 on the variable which represents the unanticipated portion of the industry wage bill. A positive coefficient, on the
### Table 6
Testing the Impact of Wage Rents on Price-Cost Margins

Coefficients from OLS regression with PCM3 or PCM4 as the dependent variable; t-statistics in brackets. For specification a, 1975 and 1982, the second t-statistic reported is the White heteroscedasticity consistent measure.

<table>
<thead>
<tr>
<th></th>
<th>PCM3</th>
<th>PCM4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONC.</td>
<td>0.74</td>
<td>1.08</td>
</tr>
<tr>
<td>RATIO</td>
<td>(1.91,1.79)</td>
<td>(2.21)</td>
</tr>
<tr>
<td>ADVERT.</td>
<td>0.75</td>
<td>0.76</td>
</tr>
<tr>
<td>RATIO</td>
<td>(4.90,4.15)</td>
<td>(4.70)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.38</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>(1.93,2.06)</td>
<td>(1.79)</td>
</tr>
<tr>
<td>WAGE</td>
<td>-0.99</td>
<td>-0.90</td>
</tr>
<tr>
<td>RENTS</td>
<td>(2.69,2.77)</td>
<td>(2.39)</td>
</tr>
<tr>
<td>PLANT</td>
<td>-0.13</td>
<td>-0.30</td>
</tr>
<tr>
<td>SIZE</td>
<td>(1.00)</td>
<td></td>
</tr>
<tr>
<td>CAPITAL</td>
<td>-0.37</td>
<td>0.36</td>
</tr>
<tr>
<td>INTENSITY</td>
<td>(0.71)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.310</td>
<td>0.319</td>
</tr>
<tr>
<td>$\bar{R}^2$</td>
<td>0.281</td>
<td>0.276</td>
</tr>
</tbody>
</table>

**Notes**

All variables are as defined in Appendix A with the following amendments: concentration/1000; plant size/10; capital intensity/100. Wage rents are defined as manual workers' estimated wage premia expressed as a proportion of industry net revenue.
other hand, would imply that wage rises are anticipated and marked-up in advance. Results of OLS regressions are shown in Table 7. The coefficient on wage inflation is not significantly less than zero for any year or any definition of the profit margin, and indeed is usually positive.

### Table 7

**The Effects of (Unanticipated) Wage Inflation on Price-Cost Margins**

Reporting the estimated coefficients (t-statistics in brackets) from OLS regression of price-cost margins on wage inflation; the other explanatory variables (not reported here) are concentration, advertising intensity and growth of demand. The samples are the same as in Table 6.

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>(Year)</th>
<th>PCM1</th>
<th>PCM2</th>
<th>PCM3</th>
<th>PCM4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage Inflation</td>
<td>1975</td>
<td>-0.25</td>
<td>0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.52)</td>
<td>(1.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>0.67</td>
<td>0.77</td>
<td>1.39</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.09)</td>
<td>(1.58)</td>
<td>(1.94)</td>
<td>(2.02)</td>
</tr>
<tr>
<td></td>
<td>1982</td>
<td>1.76</td>
<td>1.65</td>
<td>0.64</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.01)</td>
<td>(1.20)</td>
<td>(0.86)</td>
<td>(1.50)</td>
</tr>
</tbody>
</table>

Wage Inflation for 1975 and 1979 is defined as the annual rate of growth of hourly wages of male manual workers (measured relative to the average growth of wages; 25.3% in 1975 and 17.4% in 1979; source: Employment Gazette) multiplied by the ratio of manual workers' wage bill to industry revenue (defined in gross or net terms according to the definition of the price-cost margin). For 1982, the measure is derived from the Census of Production figures for production workers' average earnings compared with 1981.
Simultaneous equation bias is frequently cited as an econometric problem in industrial organisation studies (e.g. Sawyer, 1982 and Geroski, 1982) where a case can be made out that any (or all) of the explanatory variables in a single equation might be contemporaneously influenced by the others. I test for endogeneity by a variant of the Hausmann test as proposed by Nakamura and Nakamura (1981) which amounts to adding to the regression the residuals obtained from regressing each of the explanatory variables which is suspected of endogeneity on a set of exogenous or pre-determined variables. Where a t-test on a single variable or an F-test on a sub-group of these extra regressors is statistically significant at or near the 10% level, I conclude that these variables may be endogenously determined and report the appropriate two-stage least squares regression results.

These results are subjected to further econometric testing for potential bias due to missing variables and endogeneity - see Table 8. First, I test whether the inclusion of import and export ratios affects the estimated coefficients on wage rents and wage inflation. Since foreign trade data is broken down by the SIC only after 1980, I restrict these further tests to the 1982 results, but extend the tests to include the alternative definitions of profit margins (PCM 1&2) which are based on gross rather than net output. Controlling for trade (comparing specification b. with a. in Table 8) adds significantly to the explanatory power of the regressions, and has the effect of reducing the estimated coefficients (and t-statistics) on both wage rents and wage inflation on all definitions of the price-cost margin; the coefficient on wage rents is negative (except for PCM1) and is significantly less than zero at the 1% level for PCM3&4. In all cases, the coefficient on wage inflation is positive, but not significantly greater than zero even at the 20% level.

The Hausmann tests provide some weak evidence (at the 20% level) that wage rents may be determined endogenously. For PCM3&4 there is similarly weak evidence that concentration and advertising may be jointly endogenous. The appropriate instrumental
**TABLE 8**

1982 PCM REGRESSIONS - CONTROLLING FOR TRADE AND ENDOGENEITY

Estimation is by OLS (specification a) or by Two-Stage Least Squares (specifications b' and b''). The first bracketed number underneath a coefficient is the standard t-statistic. The second bracketed number is the Hausmann t-statistic, testing for exogeneity. The first F-statistic tests the joint significance of the regressors; the second F-statistic tests their joint exogeneity. * indicates that a coefficient has been estimated by instrumental variables.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>CONC</th>
<th>AD</th>
<th>GROW</th>
<th>WAGE RENTS</th>
<th>WAGE INFL.</th>
<th>IMPORT</th>
<th>EXPORT</th>
<th>R²</th>
<th>(F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCM1</strong> a.</td>
<td>-0.50</td>
<td>0.08</td>
<td>0.29</td>
<td>0.94</td>
<td>1.67</td>
<td></td>
<td></td>
<td>0.1450</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.14)</td>
<td>(0.62)</td>
<td>(3.42)</td>
<td>(1.30)</td>
<td>(0.96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>-0.63</td>
<td>0.19</td>
<td>0.28</td>
<td>0.55</td>
<td>1.02</td>
<td>-0.15</td>
<td></td>
<td>0.23</td>
<td>0.5429</td>
</tr>
<tr>
<td></td>
<td>(-1.50,0.6)</td>
<td>(1.48,0.7)</td>
<td>(1.13,1.1)</td>
<td>(0.78,1.6)</td>
<td>(0.59,0.5)</td>
<td>(-2.00,1.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b'</td>
<td>-0.61</td>
<td>0.15</td>
<td>0.26</td>
<td>-0.65*</td>
<td>0.98</td>
<td>-0.17</td>
<td></td>
<td>0.24</td>
<td>0.2160</td>
</tr>
<tr>
<td></td>
<td>(-1.44)</td>
<td>(1.09)</td>
<td>(2.69)</td>
<td>(-0.69)</td>
<td>(0.55)</td>
<td>(-2.25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCM2</strong> a.</td>
<td>-0.28</td>
<td>0.16</td>
<td>0.27</td>
<td>-0.31</td>
<td>1.68</td>
<td></td>
<td></td>
<td>0.2063</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.82)</td>
<td>(1.59)</td>
<td>(3.44)</td>
<td>(-0.54)</td>
<td>(1.22)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>-0.39</td>
<td>0.23</td>
<td>0.22</td>
<td>-0.63</td>
<td>0.81</td>
<td>-0.15</td>
<td></td>
<td>0.12</td>
<td>0.2724</td>
</tr>
<tr>
<td></td>
<td>(-1.13,0.3)</td>
<td>(2.17,0.4)</td>
<td>(1.13,1.3)</td>
<td>(1.13,1.3)</td>
<td>(0.58,0.4)</td>
<td>(-2.50,1.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b'</td>
<td>-0.36</td>
<td>0.19</td>
<td>0.20</td>
<td>-1.82*</td>
<td>0.77</td>
<td>-0.17</td>
<td></td>
<td>0.14</td>
<td>0.2471</td>
</tr>
<tr>
<td></td>
<td>(-1.04)</td>
<td>(1.75)</td>
<td>(2.72)</td>
<td>(-1.86)</td>
<td>(0.54)</td>
<td>(-2.73)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCM3</strong> a.</td>
<td>0.95</td>
<td>0.35</td>
<td>0.44</td>
<td>-0.90</td>
<td>0.48</td>
<td></td>
<td></td>
<td>0.4237</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.23)</td>
<td>(2.81)</td>
<td>(5.03)</td>
<td>(-2.61)</td>
<td>(0.66)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>0.81</td>
<td>0.43</td>
<td>0.41</td>
<td>-1.04</td>
<td>0.18</td>
<td>-0.15</td>
<td></td>
<td>0.16</td>
<td>0.4634</td>
</tr>
<tr>
<td></td>
<td>(1.94,1.5)</td>
<td>(3.88,1.5)</td>
<td>(4.66,0.7)</td>
<td>(-3.02,1.2)</td>
<td>(0.23,0.4)</td>
<td>(-1.74,0.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b'</td>
<td>0.91*</td>
<td>0.51*</td>
<td>0.41</td>
<td>-1.01</td>
<td>0.22</td>
<td>-0.13</td>
<td></td>
<td>0.17</td>
<td>0.4601</td>
</tr>
<tr>
<td></td>
<td>(2.03)</td>
<td>(2.35)</td>
<td>(4.55)</td>
<td>(2.83)</td>
<td>(0.29)</td>
<td>(1.78)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCM4</strong> a.</td>
<td>0.98</td>
<td>0.46</td>
<td>0.46</td>
<td>-1.80</td>
<td>0.99</td>
<td></td>
<td></td>
<td>0.5350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.13)</td>
<td>(3.41)</td>
<td>(4.89)</td>
<td>(-4.84)</td>
<td>(1.27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>0.96</td>
<td>0.48</td>
<td>0.37</td>
<td>-1.95</td>
<td>0.35</td>
<td>-0.18</td>
<td></td>
<td>0.01</td>
<td>0.5624</td>
</tr>
<tr>
<td></td>
<td>(2.13,1.6)</td>
<td>(3.46,1.7)</td>
<td>(3.90,0.6)</td>
<td>(-5.26,1.5)</td>
<td>(0.44,0.6)</td>
<td>(-2.26,0.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b'</td>
<td>0.98*</td>
<td>0.58*</td>
<td>0.38</td>
<td>-1.90</td>
<td>0.41</td>
<td>-0.18</td>
<td></td>
<td>0.03</td>
<td>0.5587</td>
</tr>
<tr>
<td></td>
<td>(2.05)</td>
<td>(2.45)</td>
<td>(3.92)</td>
<td>(-4.96)</td>
<td>(0.50)</td>
<td>(-3.31)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b'</td>
<td>0.89*</td>
<td>0.67*</td>
<td>0.42</td>
<td>-1.35*</td>
<td>0.56</td>
<td>-0.17</td>
<td></td>
<td>0.03</td>
<td>0.5405</td>
</tr>
</tbody>
</table>
Notes to Table 8

1. All variables are as previously defined. Wage Rents and Wage Inflation are expressed as ratios of net or gross output according to the definition of the dependent variable. Wage Rents have a mean value of 3.2% and a standard deviation of 3.0% of the value of net output. The measure of unanticipated wage inflation is centred on zero with a standard deviation of 1.4% of the value of net output. IMPORT and EXPORT are defined as the ratio of the value of imports / exports to the value of domestic sales with means (s.d.) of 18.7% (15.1%) and 19.2% (16.8%) respectively. The sample is of the 89 3-digit industries on the 1980 SIC for which matching data on production costs and wage levels are available, excluding nationalised industries.

2. * indicates that a coefficient has been estimated by instrumental variables. The instruments comprise : capital intensity, plant size, the ratio of female to male employees, the ratio of production to non-production workers, the proportion of employment located in the South East region, import and export ratios for 1979 and 1981, the 1980 concentration ratio, wage and salary levels in 1979.

3. In both specifications 3b. and 4b. the Hausmann test rejects the joint exogeneity of concentration and advertising at the 10% level of significance ($F_{3b,2}=2.49$ and $2.80$ respectively). When wage rents are included as well, the joint exogeneity of the three variables is not rejected in 3b. ($F_{3b,2}=1.84$) and is on the borderline of statistical significance at the 10% level in 4b. ($F_{4b,2}=2.20$). Accordingly, 3b' and 4b' treat concentration and advertising as endogenous variables in two stage least squares estimation, whilst 4b' treats wage rents as also endogenous.

variable estimation is reported in specifications b'. and b''. where we find that the coefficient on wage rents is negative in all cases and significantly less than zero at the 10% level for PCM2 and at the 1% level for PCM3&4. In all cases, the coefficient on wage inflation is positive but insignificant.

We are led, then, to the conclusion that labour market conditions can affect price-cost margins (hence income distribution), and that it is the level of wage rents in an industry rather than the rate of wage inflation which erodes margins. This conclusion appears to be robust over tests on three different years and over a wide range of definitions of the profit margin and specification of the explanatory variables. Controlling for heteroscedasticity and simultaneous determination serves only to reinforce the results. It is of particular interest to note that, on the basis of the preferred 2SLS estimates, the hypothesis of efficient bargaining on a vertical contract curve (which implies a coefficient of -1 on Wage Rents) is not rejected.
on any of the definitions of the price-cost margin. This finding accords with the analyses of US bargaining outcomes by Clark (1984) and Svejnar (1985).

5. CONCLUSIONS

The cross-section study reported in the previous section clearly indicates that UK manufacturing price-cost margins are influenced by workers' bargaining strength. But it is the level of wage rents in an industry rather than the rate of growth of wages which cuts into profits. This evidence rejects the hypothesis that wage changes are marked-up with a significant time lag, supporting instead the hypothesis that employers are constrained from marking-up wage rents because they bargain with unions over levels of employment (and implicitly, therefore, levels of output and price). The evidence implies that employers set output and price as if they were facing only the alternative wage, so that any bargained wage premia are deducted directly from profits rather than being passed on; this is consistent with the hypothesis that bargaining is efficient and that unions are "risk-neutral" rent-maximisers.

This cross-section analysis of UK manufacturing goes some way to illuminating the questions raised in the earlier sections. The weakened position of manual workers in the 1980s (evidenced by their loss of earnings relative both to productivity growth and to the earnings of non-manual employees) does appear to have contributed to a rise in the share of profits, implying that the recent changes in the functional distribution of income are not simply due to industrial restructuring. Why should a reduction in union bargaining strength result in higher profit margins rather than lower prices? The answer appears to be that employers and unions bargain over job levels as well as over wages; for if oligopolistic pricing is constrained by job-bargaining, shifts in bargaining strength directly affect profit margins and income distribution.
The evidence does not support the competing hypothesis that labour strength affects profit margins through a sluggish response of pricing to wage rises. Rather, the hypothesis of efficient bargaining on a vertical contract curve is apparently supported in this study - as it is in recent US studies. I suggest, however, that we should regard such findings as tentative. Theoretical models of efficient bargaining are perhaps too simplistic in assuming full information and no transaction/monitoring costs; and the econometric tests, both those reported here on UK data and those referred to which use US data, rely on rather stringent assumptions about the functional form of production or revenue functions and their stability across either time or industries. We may be sceptical about results which appear to show, perhaps rather too glibly and neatly, that bargaining is efficient and that the contract curve is vertical. Nevertheless, the evidence does strongly suggest that labour strength affects profit margins - and we may regard bargaining over jobs as a tentative, though certainly not exclusive, explanation.

The cross-section analysis of inter-industry wage differentials provides some weak confirmation of the time-series findings of other authors that unemployment plays a significant role in undermining the bargaining strength of manual workers. We find that the onset of mass unemployment accounts for around one half of the observed fall in manual workers' hourly earnings relative to their non-manual counterparts. The accompanying evidence on industrial pricing indicates why such a shift in labour strength should have influenced income distribution rather than merely affecting prices.
FOOTNOTES

1. See, for instance, Weiss (1966) and Adams and Brock (1984) on US data; Tylecote (1975), Stewart (1983), Ceroski, Hamlin and Knight (1982) for UK data; and Brown et al. (1984) for Australia. All these studies find that industry profitability, or proxy measures such as industrial concentration, are positively correlated with wage levels.

2. We expect to observe counter-cyclical movement in the share of earnings due to temporary labour hoarding and/or the overhead nature of some labour costs. But the decline in labour share in the mid 1980s is far more severe than we would expect to observe in such a period of mild recovery.

3. Table 2 shows that productivity in manufacturing has outgrown the product wage since 1979. This does not necessarily imply that profit margins have changed, since the relative cost of other inputs, including imports of raw materials, may have risen over this period due to changes in terms of trade and/or exchange rates. But, in fact, the index of input prices for materials and fuels purchased by manufacturing industry has grown, by 47%, slightly slower over the period 1979-84 than the index of output prices for home sales which rose by 51%. (Source: Economic Trends, April 1985).

4. The Bank of England Quarterly Bulletin (Sept. 1984, p.353) notes that: "Profitability in manufacturing industry turned up before there was any substantial growth in manufacturing output, and stemmed in large part from gains in profit margins".

5. A variety of legislative and political attacks on trade union organisations were also instituted in the 1980s, but it is arguable that these moves were only feasible in the context of a trade union movement reeling under the impact of mass unemployment.

6. Profit margins are a primary determinant of functional income distribution, though changes in the composition of fixed and non-labour variable costs would also affect distribution, as would economies/dis-economies of scale if mark-ups are applied to marginal rather than average variable costs.

7. Evidence that manufacturing industry margins are negatively correlated with labour strength (as measured by unionisation) is adduced by Cowling and Motho (1982) for the UK and Freeman (1983), Clark (1984) and Karier (1985) for the US.

8. Defining the real exchange rate as the nominal exchange rate (US dollars per £ sterling) deflated by the ratio of the US GDP deflator to the UK GDP deflator.

9. The union utility function can also be considered as an expression of union attitudes towards membership size, inequality amongst members, solidarity, etc. in which case the parameter r can be considered to measure simply the weight which the union attaches to increasing employment relative to increasing the wage.

10. For instance, Weiss (1966), Wabe and Leech (1978), Stewart (1983), Brown et al. (1984), Blanchflower (1983 and 1984), Clark (1984) and Svejnar (1986) use as explanatory variables one or more of unionisation (coverage or membership), industrial concentration and profitability in order to explain wage differentials. Some bargaining relationship is implied, though not specifically modelled in most labour market studies. Clark (1984) does employ specific bargaining models in his study of 900 US product
line businesses between 1970 and 1980, concluding that while unionisation reduces firms' profitability, it has little effect on growth and on capital-labour substitution. (He deduces support for the model of bargaining on a vertical contract curve.) One of the deficiencies of Clark's study is that it treats workers' bargaining strength as a function of unionisation alone. A more extensive, but avowedly ad-hoc, treatment of union bargaining strength comes from Svejnar (1986) who investigates the asymmetric Nash-bargaining model applied to data on 12 major US unionised companies; he concludes that bargaining power is influenced significantly by both inflation and unemployment.

11. The functional form of specification b comes from an assumption that the ratio of wage rents to profits is a linear function of the bargaining variables, with a normal random error term. The derivation of the weights for maximum likelihood estimates of this functional form is as follows. Since equation 9b predicts that the error term is heteroscedastic in a known form, we can construct appropriate weights for weighted least squares estimation:

\[ Q_i = k' + kP_i \]

where \( P_i \) is profit per worker in industry \( i \). But we need to choose \( k' \) and \( k \).

Stewart and Wallis (1981, p.257) give the likelihood function (on the assumption that the error term is heteroscedastic but normally distributed) which can be written as:

\[ -2 \log L = n \log 2\pi + \sum Q_i^2 + \sum (R_i / Q_i)^2 = \log 2\pi + V(k', k) \]

where \( R_i \) is the residual: \( W_i = c, Y_i - g(Z, P_i) \).

The maximum likelihood estimate is given by finding those values of \( k' \) and \( k \) which minimise \( V(k', k) \), the sum of the squared weights added to the sum of the squared weighted (least squares) residuals. I suggest here a method of reducing the dimensions of the search from two parameters to one, noting that the weighted least squares estimates of \( c \) and \( g \) depend only on the ratio \( k'/k = (k') \), for it is the ratio of the weights, not their absolute values, which affect the coefficient estimates. So I define the following:

\[ Q_i^2 = k(k' + P_i)^2 \]
\[ A(k') = \sum (k' + P_i)^2 \]
\[ B(k') = \sum (R_i / (k' + P_i))^2 \]

where \( A \) and \( B \) are simply the sum of the squared weights and sum of the squared residuals (obtained from least squares regression with \( Q_i \) as weights), with \( k \) set equal to unity.

In general, the sum of the squared weights is:

\[ \sum Q_i^2 = k^2 \cdot A \]

and the sum of the squared weighted residuals is:

\[ \sum (R_i / Q_i)^2 = B \cdot k^2 \]

The sum of these two expressions \( (= V(k', k)) \) is minimised with respect to \( k \) when \( k^2 = (B/A)^{1/2} \), in which case

\[ V(k') = V(k', k) = 2(AB)^{1/2} \]
The maximum likelihood estimate is found by searching for that value of k* which minimises the product AB.

12. I have corrected for differences in overtime hours worked by including a variable which is calculated as the ratio of overtime to total weekly hours, multiplied by the hourly wage rate. If the overtime premium is some fraction P of the normal hours wage W*, if normal hours are 40, and actual hours are H, then the observed hourly wage W is given by:

\[ W = W^* + P \cdot W^*(H - 40) / H; \]

or since, W* is unobserved, we can write the approximation:

\[ W \approx W^* + P \cdot W \cdot (H - 40) / H. \]

So the coefficient on the overtime variable W(H-40)/H is an approximation (a slight under estimate) to the actual overtime premium. The estimates for 1975 and 1979 are 0.47 and 0.66 which fit well within the expected range (between one third and one, depending on the day on which overtime is worked). Very similar results are obtained by adjusting the dependent variable directly for various overtime rates, choosing the rate which minimises the sum of squared residuals.

13. We might expect the alternative wage to be particularly low for industries in those regions with a high concentration of other low-paying industries. Although the East Midlands (at September 1981) had only 8.8% of total manufacturing employment, this region was the location of 20% of textile industry employment, and 14% and 15% of leather and clothing industry employment respectively. The North West had 13.2% of total manufacturing employment, but 19%, 15% and 18% of employment for these three industries (and 24% of textile industry employment in 1979).

14. Other variables have been omitted from preliminary specifications if they were not statistically significant at the 20% level. These omitted variables are the other standard regions and the proportion of the male manual workforce with the following characteristics: (a) having responsibility for the work of others; (b) having a trade apprenticeship; (c) having trained since starting the current type of work.

15. I note Hart and Morgan's (1977) concern that there may be some spurious correlation because the numerator of PCM contains advertising and market research expenditures as part of overhead costs. This might be a particular problem if advertising intensity is measured relative to the same measure of revenue as is used in the denominator of PCM. I have tried to minimise this problem by measuring advertising expenditures relative to value added (noting that the Census of Production category from which advertising expenses are taken does also cover expenditure on royalties, etc.). All concentration measures refer to domestic production rather than domestic markets, omitting export and import ratios. Lyons (1981) reports on UK manufacturing in 1968 and finds that both import and export intensities affect price-cost margins, a point which is controlled for later.

16. Hay and Morris (1979, p.209) comment that: "a criticism of all studies of concentration and profitability is that other important variables are omitted, notably barriers-to-entry variables". They seek to reconcile collusive and competitive theories of oligopolistic pricing by arguing: "concentration (is) a help to co-operation between firms, so that prices (can be) raised... But in long-run equilibrium a limit is given by the entry-limit
price". Cowling's (1981) counter-argument is that excess capacity, and the credible threat of price-war, can deter entry so rendering conventional entry barriers irrelevant.

17. One approach to this problem is to compare the actual variability of manual and non-manual employment. Examining aggregate manufacturing employment over the period 1971-82, the coefficient of variation for manual workers is more than twice that for non-manuals. Breaking variations in employment down by 106 3-digit industries over the period 1974-79, the average of the ratio between the two coefficients of variation is nearly one and a half. However, the greater relative variability of manual employment is due, at least in part, to the relatively greater secular decline in manual employment in manufacturing: manual workers comprised 73.4% of the manufacturing workforce in 1971, but 68.4% in 1982. So the apparently much greater variability in employment for manual workers is not conclusive.

On the other hand, if we examine weekly hours of work the evidence is much clearer. Over the period 1972-79, examining manual averages of weekly hours worked in all manufacturing industry, the coefficient of variation for manual hours is twice that on non-manual hours; over the period 1977-83 it is three times as high (though this last figure is influenced by a decline in the normal manual working week in the early 1980s from 40 to 39 hours).

18. The average rate of national insurance contribution on manual earnings is estimated by linear OLS regressions of wages and salaries on total N.I. payments. The estimated rate is 0.109 (t=-14.8) for 1975, 0.173 (t=-28.1) for 1979 and 0.161 (t=-16.9) for 1982 - in each year the rate on manual earnings is below that on salaries, as we would expect with a mildly progressive pay-roll tax.

19. Estimating the coefficient to be -1 is equivalent to finding that variations in margins are explained better when wages above the alternative wage are treated as fixed costs.
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APPENDIX A

DEFINITIONS OF VARIABLES

All variables refer to industry averages at the 3-digit industry level on the Standard Industrial Classification.

A. Wages and Characteristics of Workforce and Jobs


HOURS: weekly hours worked (as above).


0-5 YEARS: proportion of full-time manual male workforce with less than 5 years of service, 1979 and 1983. (NES 1979 and 1983).

AGE: average age (years) of male manual workers in 1975, expressed as deviation from the overall mean of 38.9 years. (NTS)

FURTHER EDUCATION: proportion of workforce in 1975 with further education or adult education experience since starting work. (as above).

TRAINED: proportion of workforce who needed some form of special training to obtain current job. (as above)

JOB TRAINING: proportion of workforce given training for the current type of work since starting. (as above)

OVERTIME: average industry overtime hours for male manual workers (taking normal hours as 40 in 1979 and 1975, and 39 in 1983) expressed as a proportion of total hours worked, multiplied by the hourly wage.

SHIFTWORK: the percentage of male manual gross earnings made up by shift premium payments. (NES 1975, 1979 and 1983.)

PBR: the percentage of male manual earnings made up by payment-by-result payments. (as above)

Notes

1. The data from the National Training Survey is not given - or is not reliable - for the smallest industries; in which case the average figure for the appropriate industry group or order is used.
B. Bargaining Variables

\[
\text{CAPITAL INTENSITY} = \left( \sum \text{net investment} \right) / \text{value added}
\]
for 1975, \( t = 1971, T = 1975 \)
for 1979, \( t = 1971, T = 1979 \)
for 1982, \( t = 1979, T = 1982. \)
(COP 1975 - 1982.)

\text{UNION COVERAGE} \text{ proportion of workforce covered by national and/or local collective agreements in 1973 (for 1975 regressions) and in 1978 (for 1979). (NES).}

\text{UNEMPLOYMENT RATE} \text{ number of registered unemployed (in June 1975 and June 1979) / number of employed operatives (1975 and 1979); number of registered unemployed in May 1982 (end of series broken down by industry) / total employment March 1982. (1982 figures adapted from SIC 1968 to SIC 1980). (EG and COP.)}

\text{GROWTH RATE} \text{ proportional growth in total employment over previous year, for 1975 and 1979; growth over previous four years for 1982. (COP.)}

\text{CONCENTRATION} \text{ industry 5 firm concentration ratio by gross output of enterprises ranked by employment. (COP.)}

\text{FEMALE RATIO} \text{ female employment as proportion of total employment. (EG.)}

\text{STAFF RATIO} \text{ employment of clerical, technical, administrative and managerial staff / employment of operatives. (COP.)}

\text{PLANT SIZE} \text{ natural logarithm of the average number of operatives (for 1975 and 1979) or employees (for 1982) employed per plant by the five largest enterprises in the industry. (COP.)}

C. Price-Cost Margin Variables

\text{NET OUTPUT} \text{ is calculated by deducting from gross output the cost of purchases (net of any change in stocks), the cost of industrial services - including amounts payable to other firms for out-work, repairs and maintenance, and sublet contracts - and, when applicable, duties etc. (COP.)}

\text{WAGES} \text{ gross amount paid during year to operatives (broadly speaking, all manual wage earners) including the value of redundancy payments, net of government reimbursements. (COP.)}

\text{SALARIES} \text{ gross amount paid during year to administrative, technical and clerical employees, employed directors, managers, superintendents, foremen, research and design employees, draughtsmen, etc and all office employees. (COP.)}

\text{NATIONAL INSURANCE} \text{ employers' national insurance contributions. (COP.)}

\text{CONCENTRATION RATIO} \text{ see above.}
ADVERTISING INTENSITY: ratio of other non-industrial costs (advertising, royalties, etc.) to value added. (COP.)

GROWTH: see above.

WAGE PREMIUM: excess of actual wage over estimated alternative wage (see text).

WAGE RENTS: (wage premium/wage) x wages.

WAGE RISE: proportional rise in hourly earnings over previous year, less the average wage rise (25.3% in 1965, 17.4% in 1979). (EG.)

WAGE BILL RISE: = wage rise x wages.

PCML4: alternative definitions of price-cost margins - see text.

PROFITS: value added - wages - salaries - national insurance. (COP.)

SOURCES

EG = Employment Gazette, published monthly by the Department of Employment.

COP = Census of Production, Summary Tables, published by the Department of Industry.

NTS = National Training Survey 1975, see "People and their work", published by the Manpower Services Commission (1978). Data tape kindly provided by Mark Stewart.

NES = New Earnings Survey (Department of Employment).
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