Collective Bargaining Structure, Wage Levels and the Functional Distribution of Income.

Andrew Henley

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ABSTRACT

This paper presents evidence on the impact of trade unions on wageshare under different collective bargaining arrangements, using a Kaleckian degree of monopoly framework. Comparable results are presented for union impact on wage levels and from these inferences are drawn about how the impact on wageshare is broken down into wage and productivity effects. It is found that unions make most distributional gains where bargaining is on a two-tier level, allowing unions flexibility to push down the degree of monopoly yet preserving national solidarity.

1. Introduction

In a recent paper Cowling and Molho (1982) presented empirical findings for the impact of trades unions on wage share using a Kaleckian framework where income distribution is determined by the degree of monopoly. This paper extends that work in two directions. The first is to ask how that union impact is assembled from the effect of unions on wage and on productivity separately, since wage share can be defined as average wage divided by average productivity. The second is to ask how union impact varies with different collective bargaining structures. As Cowling and Molho suggest (1982, p.103) it would seem clear that Kaleck's hypothesis about the impact of unions implies that unions will have a greater impact on the functional distribution of income where bargaining contains a local, plant by plant component. This paper confronts that assertion with empirical data.

2. Theoretical Background

Analysis of the behaviour of income shares has traditionally rested upon the use of the production function, and so floundered as neoclassicals tried desperately to justify the theoretical existence of such functions. Incorporation of trades unions into the production function system was difficult because of the simultaneous effects that they could, in theory, have on the various parameters of the system - parameters about which horrendous assumptions would have to be made in order to allow the empirical estimation of the function. In addition to this it was largely thought that trades unions would be ineffective in any attempts to swing the functional distribution of income in their favour (see, for example, Kerr, 1957).

To summarise - the effects of trades unions in the neoclassical world are principally twofold. The first if their effect on the relative prices of capital and labour; the second their effect on technical progress. However the effect on income distribution of a union induced increase in real wages depends crucially on the value of the elasticity of substitution - only if σ is less than one will increased real wages raise labour share. Applied work in this area principally addressed itself to estimating a value for σ (see Nerlove, 1967). In a time series context one has to account for technical progress, which complicates matters considerably. Anecdotal evidence usually suggests that trades unions serve to arrest the course of technical progress. In a neoclassical world the crucial question to ask is what type of technical progress are trade unions holding up. The unions themselves might argue that new technology reduces employment - but even with capital-using progress labour share may well increase if the elasticity of substitution is less than one and low enough to mean that the relative decrease in the demand for labour caused by this capital-using technical progress is more than offset by the decrease in the relative supply of labour caused by low factor substitutability and capital deepening.

An early attempt at examining micro-distribution but avoiding all the problems associated with production functions is that of Kalecki (Kalecki, 1938). Starting from a micro-economic definitional statement of a firm's cost structure Kalecki aggregates up to obtain a macro-economic theory of distribution: "the relative share of gross capitalist income and salaries in the aggregate turnover is with great approximation equal to the average degree of monopoly" (op.cit., p.102). And therefore since definitionally capitalist income and salary share and wage share sum to one a direct relationship is established between wage

share and the degree of monopoly. The attraction of the Kalecki model is that it relates income distribution to industrial structure. Trades unions enter this sort of world through their effect on firms price-cost margins (Kalecki, 1971). An implication of this is that high margins will encourage strong trades unions to bargain hard as they know that firms can afford increased wages. Initially firms will pass the higher wages on into higher prices but there will be a limit to their willingness to keep doing this - at this point of course unions start to increase their relative share. We have assumed that trades unions are able to obtain reasonably accurate information about a firm's profitability. It may be that unions bargain as hard as they are able and those lucky enough to be in industries with high price cost margins make inroads into income distribution.

Kalecki's work was for a long time condemned by neoclassicals as tautological - they were particularly vicious in their criticism of his idea that the mark-up of prices on costs could be defined as the "degree of monopoly". Cowling and Waterson (1976) have made good this deficiency by the construction of a model of firm behaviour that when aggregated across an industry introduces a clear theoretical link between a measure of market structure (the Herfindahl index) and the price-cost mark up. The model has been refined in later work (Cowling 1982) and starts from an individual firm profit function. The first derivative is set equal to zero for maximisation and the result summed over all firms in the industry to give:

$$\frac{P_k - C_k'(X_k)}{P_k} = \frac{\alpha_k}{\eta_k} + \frac{(1 - \alpha_k H_k}{\eta_k} \qquad (1)$$

where p_k is price in industry k

c'_k is industry k's marginal cost function

X is output

H is the Herfindahl index: $\Sigma\left(\frac{X_{ik}}{X_k}\right)^2$

η_k is price elasticity of demand

α_k is the conjectural variation term: $\frac{dX_{jk}}{dX_{ik}} \cdot \frac{X_{ik}}{X_{jk}}$

i and j are firms in industry k.

To obtain a theory of distribution requires a bit more manipulation and the introduction of the assumption of constant marginal cost. This enables one to write

$$\mu = \frac{\Pi^*_k + F_k}{P_k X_k} \qquad (2)$$

where F is overhead costs

Π^* is profits

By definition Y_k (value added) $= W_k + F_k + \Pi_k$ where W_k is the wage bill of production workers, and $R_k = p_k X_k$. Multiplying by R_k/Y_k one obtains:

$$\mu_k \frac{R_k}{Y_k} = \frac{\Pi_k + F_k}{Y_k} \qquad (3)$$

The right hand side is the share of profits and overheads in value added and so is equal to one minus wage share. μ_k as we have already seen is the industry degree of monopoly and is derived theoretically from the three market structure and conduct variables.

$$1 - \frac{W_k}{Y_k} = \left[\frac{\alpha_k}{\eta_k} + \frac{(1-\alpha_k)H_k}{\eta_k}\right]\frac{R_k}{Y_k} \qquad (4)$$

Cowling and Molho (1982) approximate this model log-linearly and add a unionisation variable to measure the impact of trades unions on wage share. Their conclusions, based on cross section data for 118 Minimum List Heading industries, can be briefly summarised as showing that these degree of monopoly factors have a significant negative effect on wage share. Unionisation is found to be significantly positively related to wageshare, although the net effect of higher concentration on wageshare is unambiguously negative. Unionisation is variously measured by union membership, number of strikes, strike duration and collective agreement coverage.

In the degree of monopoly model the form of collective bargaining adopted by capitalists and workers is crucial to the outcome in terms of wage share achieved. The simple Kaleckian hypothesis suggests that unions will be most effective where they can force wage increases without allowing capitalists to raise product price, and hence at the macroeconomic level leave real wages constant. Kalecki (1971) argues that unions have an impact on the distribution of income in an oligopolistic industry where wage increases are specific to one firm and that firm perceives a kinked demand curve for its product and is therefore very reluctant to unilaterally raise its price. It is therefore in the interests of a group of oligopolists to adopt some form of collusive wage setting. This suggests a model in which unions and capitalists have some form of preferred bargaining structure (see Marginson, 1983), and the observed outcome results from the relative strengths of the two parties in the model. The preferred structure from capitalists' point of view is one

where the impact unions have on the degree of monopoly is minimised - one where firms can bargain at the industry level and avoid being "divided and conquered" by the unions. Unions in turn would prefer a bargaining structure where they can force firms to raise wages but not prices and hence not wage share - a bargaining structure with a firm by firm, or plant by plant component to it.

This all seems to run in a counter-intuitive fashion to the more conventionally cited picture of capitalists aiming to force unions into plant by plant bargains in order to "divide and conquer". This is often cited as occuring in multi-plant enterprises.

However unions may perceive that a two-tier structure with some form of national industry-wide agreements with locally bargained pay supplements will best suit their purposes. Such would enable them to affect the degree of monopoly while maintaining their power and solidarity at the bargaining table. Certainly the Kaleckian hypothesis holds up well against the experience since 1979 when industries have been keen to replace the lucrative, from workers' point of view, two tier productivity bargaining structure identified by the Donovan Commission with national-only agreements in response to weaker unions in high unemployment. Attempts to reimpose supplementary agreements would be a predicted union counter-response.

3. The Estimating Equations

In order to estimate the impact of collective bargaining on wageshare through the degree of monopoly the Cowling and Molho model is used, but instead of one unionisation variable a series of three are

included to capture the importance of three types of bargaining agreement. These variables obtained from the 1973 and 1978 New Earnings Survey measure the proportions of male manual workers in a particular MLH industry that are covered by national plus supplementary agreements, national only agreements, and local only agreements. A stronger positive coefficient on the national-only variable indicates support for the pure Kaleckian hypothesis that under this sort of structure unions' impact on the price-cost mark-up is greatest. A stronger positive sign on the national-plus-supplementary variable would lend support for the two-tier argument that unions require national strength as well as local flexibility in lowering price-cost margins. Cowling and Molho's other explanatory variables are chosen for their roles in determining the degree of monopoly. Three similar variables are employed here. The first is the 5-firm concentration ratio. This is used to pick up the effect of market structure and is used since Herfindahl indices are unavailable from the Census of Production. A second variable is intended to measure the effects of the conjectural variation term, α, and the elasticity of demand and attempts to measure the advertising-sales ratio. Since the Census of Production has ceased to measure advertising costs as a separate item since 1973 we have to make do with a category described as "Costs of other non-industrial services received" which is made up of advertising and professional services expenses. We might safely assume that professional services costs are incurred strictly in proportion to an industry's size, or in any case may be largely concerned with sales effort. We expect negative coefficients on these two variables since the effect of a rise in each of them is to raise the degree of monopoly and hence lower wageshare. The third variable is one measuring the annual growth rate of each industry's sales. Where an industry is growing fast one might expect a higher than average degree of monopoly as firms

are in a stronger position to raise mark-ups and so a negative coefficient.

In addition three new variables are added. The first is the proportion of administrative, technical and clerical staff in total employment. As this variable increases so control over the work process is removed from the operative workforce. A larger proportion of technical staff will indicate that production have reduced technical know-how to be capable of regulating the work process themselves. Operatives lose their bargaining strength as their proportionate group size decreases and lose control over their productivity. Therefore a negative coefficient is expected. The other two variables measure average plant size by employment and the proportion of females in total employment. These two are generally included in equations describing the union impact on relative wages as explanation of labour market conditions and therefore it will be interesting to see whether their usually hypothesised positive and negative effects on wage levels hold up for wageshare or whether wageshare is solely determined in this model, as the theory suggests by the degree of monopoly.

As an approximation to the degree of monopoly equation we adopt a log-linear functional format:

$$\ln \frac{W_i}{Y_i} = \alpha_i + \beta_i \ln(Z_i) + \varepsilon_i \qquad (5)$$

where $\frac{W_i}{Y_i}$ is operatives wageshare in value added in industry i

α is the constant

β_i is a vector of coefficients on Z_i, the vector of explanatory variables discussed above

ε_i is the random disturbance term.

Implicit in this analysis is an underlying identity that wage share can be defined as the ratio of average operatives' wage and average operatives' productivity. Let operatives' wage bill (W_i) be decomposed as $W_i = w_i L_i$ where w_i is average operatives' wage in industry i and L_i the number of operatives. Therefore:

$$\frac{W_i}{Y_i} = \frac{W_i/L_i}{Y_i/L_i} = \frac{w_i}{a_i} \qquad (6)$$

where a_i is average operatives' productivity in industry i.

Trades unions obviously have an impact on both w_i and a_i and so their effect on wage share can be additionally decomposed into a wage effect and a productivity effect. There is of course a large empirical literature on both of these effects. The impact of unions on wages under different bargaining regimes has in particular been examined by Mulvey (1976). The estimation of union productivity effects rests on the use of a production function whose underlying assumptions would be incompatible with the degree of monopoly framework. One such study for the U.K. using the N.E.S. coverage data does exist (Caves 1980). His findings are that unions lower productivity where bargaining contains a national component, either national only or national plus supplementary and raise productivity where it is conducted at a local only level. A shortcoming with many such studies is that data inadequacies force their authors to adopt a monetary measure for productivity when strictly speaking it should be decomposed into a physical output measure and product price. This would remove the anomaly where, for example, a rise in the degree of monopoly might raise average productivity as measured without implying any genuine increase in the productiveness of workers, in terms of their supply of labour effort.

Census of Production data allows us to define wageshare, average productivity and average wage such that equation (6) is definitionally true for all industries. But, assuming we could overcome the inconsistency of the assumptions behind the production functions, to then estimate in turn separate equations for all three quantities as dependent variables poses an overdetermination problem - three equations and one identity in only three unknowns.

We choose therefore to only estimate comparable union wage effects. The conventional means of such estimation employs an ad hoc model of labour market imperfections which are assumed to determine wages. Such a model is therefore going to be consistent with the degree of monopoly equation's assumptions. So the second estimating equation is

$$\ln \frac{W_i}{L_i} = \lambda_i + \delta_i \ln(V_i) + u_i \qquad (7)$$

where λ_i is the constant and u_i a random disturbance term. The vector V_i contains the following:

5 firm concentration ratio

Growth of sales

Average industry plant size

Proportion of females in total employees

Proportion of administrative technical and clerical staff in total employees

The three collective agreement coverage variables as before.

By estimating the coefficients on each of the coverage variables we will then be able to infer the size and direction of the productivity effects.

The data base is a series of 6 annual cross sections for 1973 to 1978. There are some limitations, the most important being that the N.E.S. coverage data is only available for 1973 and 1978. A further problem is that no concentration series is available for 1974 - so we have to use that for 1973. In total there are 156 observations on minimum list headings. This is reduced to about 90 (depending on the year) after industries with "miscellaneous", "other" and "etc." in their titles are removed, and after several small industries are removed for which no coverage data is published due to small sample bias. In addition results for a panel with a total sample of 177 from 1973 and 1978 together are presented. A dummy variable taking the value of 1 for 1973 observations is included in these regressions. All remaining variables with the exception of the female workers proportion come from the annual Censuses of Production. The proportion of female workers is obtained from the Department of Employment's annual Censuses of Employment. The complete definition of variables is as follows:

CONC : 5 firm Concentration Ratio by employment

OTH : Cost of other non-industrial services received/Sales

GROW : Sales in year t / Sales in year (t-1)

PLA : Total employment/Number of establishments in an industry

SEX : Proportion of female employees in total employees

ATC : (total employment - operative employment)/total employment

NS : Proportion of male manual employees covered by a national agreement plus a supplementary local agreement

NO : Proportion of male manual employees covered by a national agreement only

SO : Proportion of male manual employees covered by a local agreement only

WS : Operatives Wage Bill/Value Added

WAGE : Operatives Wage Bill/number of operatives

DUM73 : Dummy variable taking value of 1 for 1973 observations.

All variables are expressed in logs.

4. Results

Results for the estimation of the wageshare equation are presented in Table 1 and those for the wage equation in Table 2. The first point to note concerns the performance of the "degree of monopoly" variables in the wageshare equations. The coefficient on the concentration ratio has the right sign and is significant in four out of the seven regressions. The coefficients imply that a 10% proportional rise in the concentration ratio will induce a 1¼% to 2% proportional fall in wageshare. The effect of market structure is confined to wageshare; from Table 2 we see that it does not affect the level of wages paid. OTH, the approximation for the advertising-sales ratio has a significant and correctly signed coefficient in three out of seven equations. However it has the wrong sign in 1976 and 1977. This indicates either that for these two years an increase in the advertising-sales ratio lowers the degree of monopoly or that our variable is deficient as a measure of the advertising-sales ratio. The Cowling-Molho hypothesis is that advertising raises the degree of

TABLE 1 : Ordinary Least Squares Estimates : Wageshare Equation - Dependent Variable : WS

	1973*	1974**	1975*	1976	1977	1978	1973 + 1978 Panel
Constant	-1.418 (-3.313)	-1.498 (-3.331)	-1.478 (-2.687)	-1.004 (-1.973)	-0.989 (-1.877)	-1.538 (-3.063)	-2.034 (-9.212)
CONC	-0.143 (-2.139)	-0.096+ (-1.357)	-0.100 (-1.169)	-0.161 (-2.002)	-0.149 (-1.778)	-0.104 (-1.348)	-0.181 (-3.210)
OTH	-0.160 (-3.130)	-0.125 (-2.531)	-0.024 (-0.431)	0.071 (1.353)	0.087 (1.513)	-0.062 (-1.048)	-0.069 (-1.669)
GROW	-1.156 (-3.402)	-1.209 (-5.933)	0.128 (0.525)	0.068 (1.140)	-0.007 (-0.193)	0.240 (0.665)	-0.231 (-0.898)
PLA	0.017 (0.439)	0.017 (0.374)	0.002 (0.032)	0.092 (1.705)	0.099 (1.748)	0.059 (1.135)	0.077 (2.234)
SEX	0.102 (2.268)	0.057 (1.354)	0.067 (1.323)	0.032 (0.602)	0.008 (0.138)	0.021 (0.435)	0.055 (1.464)
ATC	-0.588 (-6.995)	-0.585 (-7.198)	-0.686 (-7.652)	-0.632 (-6.554)	-0.652 (-6.520)	-0.612 (-6.642)	-0.613 -9.688)
NS	0.282 (5.951)	0.240 (5.453)	0.256 (5.157)	0.095 (2.134)	0.114 (2.385)	0.147 (3.308)	0.189 (5.354)
NO	-0.038 (-0.804)	-0.003 (-0.070)	-0.026 (-0.510)	0.020 (0.427)	0.041 (0.842)	0.043 (0.958)	-0.003 (-0.009)
SO	-0.040 (-0.992)	-0.054 (-1.417)	-0.045 (-1.040)	-0.136 (-3.488)	10.126 (-3.081)	-0.075 (-1.848)	-0.084 (-3.149)
DUM 73							-0.049 (-1.026)
n	88	90	90	91	91	91	177
F	17,79	21.88	12.62	12.27	11.85	11.76	19.39
R^2	0.635	0.679	0.540	0.530	0.520	0.518	0.511

Notes: + NS.NO + SO for 1973 - elsewhere for 1978; + CONC for 1973 as no series is available for 1974; t-statistics in brackets

TABLE 2 : Ordinary Least Squares Estimates : Wage Equations

	1973*	1974*	1975*	1976	1977	1978	1973 + 1978 Panel
Constant	0.636 (3.399)	0.633 (3.108)	0.897 (4.379)	1.066 (5.633)	1.219 (6.469)	1.345 (7.037)	1.401 (19.15)
CONC	-0.019 (-0.586)	-0.00006 (-0.002)	0.033 (0.957)	0.032 (1.009)	0.022 (0.685)	0.013 (0.380)	-0.006 (-0.283)
GROW	0.182 (1.181)	0.218 (2.341)	-0.138 (-1.399)	0.007 (0.463)	-0.005 (-0.355)	-0.253 (-1.667)	0.0008 (0.008)
PLA	0.024 (1.347)	0.015 (0.695)	0.020 (0.920)	0.025 (1.175)	0.017 (0.816)	0.011 (0.498)	0.021 (1.589)
SEX	-0.187 (-8.677)	-0.182 (-8.890)	-0.183 (-8.828)	-0.169 (-8.175)	-0.162 (-7.766)	-0.139 (-6.771)	-0.164 (-11.11)
ATC	0.165 (4.256)	0.158 (4.130)	0.202 (5.582)	0.175 (4.658)	0.194 (5.261)	0.195 (4.940)	0.183 (6.603)
NS	0.023 (1.029)	0.007 (0.340)	0.006 (0.276)	-0.001 (-0.069)	0.003 (0.175)	0.007 (0.384)	0.020 (1.377)
NO	0.001 (0.061)	-0.005 (0.211)	0.005 (0.228)	0.020 (1.098)	0.017 (0.904)	-0.008 (-0.396)	-0.001 (-0.090
SO	0.040 (2.077)	0.022 (1.157)	0.027 (1.496)	0.037 (2.33)	0.033 (2.082)	0.010 (0.562)	0.030 (2.535)
DUM 73							-0.789 (-42.13)
N F R^2	88 17.49 0.603	90 19.41 0.623	90 21.03 0.643	91 15.09 0.556	91 15.43 0.562	91 12.40 0.503	177 285.3 0.936

monopoly and hence lowers wageshare. This certainly seems to be the case in 1973 and 1974 and possibly in 1975 and 1978. GROW, the growth of sales variable, again is insignificant except in the first two years and wrongly signed in 1975, 1976 and 1978. We must therefore conclude that there is a limited amount of support for the degree of monopoly explanation of wageshare, although this relationship seems less empirically justified in the later 1970's.

Average plant size has a positive sign throughout and is generally insignificant. A priori we expected a negative sign. Considered together with the generally low levels of significance on SEX, the proportion of female workers, the wage share equation suggests that labour market variables do not help to explain wageshare levels. Of course SEX has a strongly positive coefficient in the wage equation but rather surprisingly PLA does not perform well. A 10% proportional rise in the ratio of women to men in a particular industry will induce almost a 2% fall in average operative wage. The behaviour of the variable measuring the proportion of technical and clerical staff in total employment (SKI) is very interesting as it is strongly significant in both equations. We observe a large negative coefficient in the wageshare equation. A 10% proportional rise in salaried staff will induce a 6 to 7% fall in wageshare. An increasing proportion of administrative and technical staff confers on this group increasing control over the work process to the extent that they presumably induce a large increase in operative productivity which when seen in the light of the size of the coefficients in the wage equation is, as we might expect, not fully recompensed. Work process control clearly confers the salaried and ownership classes with an income distribution advantage. The precise means by which this is achieved clearly, from these results, warrants further investigation.

Now we come to the results for the collective bargaining variables. The Kaleckian view was that a distinction could be drawn between where bargaining is industry-wide and where it contains a local, plant or firm element. Bargaining over wages conducted outside the protection of an oligopolistic cartel would allow trades unions an increased share of wages as it would push the industry to a lower degree of monopoly. We argued earlier that this ignores the need of unions to maintain industry-wide solidarity and so it is argued that unions would prefer a two-tier bargaining structure since in theory they could reduce the degree of monopoly in plant-by-plant, local bargaining yet they will lose out in terms of potential to make wage demands stick as they are of necessity divided amongst themselves. The results confirm this adapted story. There is a clear distinction single-tier and two-tier bargaining as Table 3 displays.

	National + Local	National only	Local only
Wageshare	.11 to .28	.04 to -.04	-.04 to .14
Wage	0 to .02	0 + or -	.01 to .04
Inferred productivity effect	strong -ve	ambiguous direction but very weak	+ve

TABLE 3 : Approximate Elasticities of wage, wageshare and productivity with respect to an increase in the importance of each bargaining structure

So only under a two-tier (national plus local) structure do unions make wage share gains, and this is mainly through their strong negative impact on productivity. In the other two cases

unions actually may make wageshare losses, particularly in the local-only structure where firms are able to extract higher average productivity from their workers.

5. Conclusions

Work on the estimation of the effect of trades unions on wageshare is as yet still scarce, and has been non-existent as far as attempting to show how that effect is made up from the effects that unions have on productivity and wage.

This paper has presented estimates of union impact on wageshare and wages and has inferred the effect, from these, on productivity. It has presented findings on the way in which different collective bargaining structures affect wageshare, and provided tentative support for a degree of monopoly explanation of wageshare where unions affect wageshare through their impact on the degree of monopoly. These findings do not entirely support the Kaleckian hypothesis that unions will prefer to bargain where some plant-by-plant element is contained within the bargain. It is argued that this is because in addition trades unions have a need to preserve national solidarity. Rather the data shows a distinction between where bargaining is single-tier and where it is two-tier. Only in the latter case are unions able to swing the functional distribution of income in their favour.

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