Conflict Inflation: Estimating the Contributions to Wage Inflation in Australia During the 1990s*

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Abstract

One of the major emerging macroeconomic problems during the century has been the tendency for inflation to accelerate under prolonged periods of full employment. According to Isaac (1977) and Kaldor (1996, 5th Lecture), this arises from the process of wage determination common to most western economics. They argue that there are three major objectives of wage earners that are in competition with one another. First, the desire to maintain relativities; secondly, the desire to have a 'fair' share of companies profits; and thirdly, a reluctance to allow any encroachment on achieved standards due to unfavourable (exogenous) events. If companies have differing rates of profit then the first objective will conflict with the second. If there are adverse changes the terms of trade, then the third objective will cause inflation. This paper tests how well the three objectives of wage earners cited above in the context of their power to effect these objectives, explains wage inflation in Australia using a times series of micro wage rate rates for detailed occupations and industries for the period 1989 to 2000. We find that wages are sensitive to the three major objectives, but not occupational unemployment rates.

Introduction

Neoclassical theories of inflation depict inflation as the excess of demand for output over the value of output at existing prices, while conflict theories represent it as the excess of income claims over the value of output at existing prices (wages, profits and taxes). The heart of the difference lies in the ultimate source of power. For neo-classicists, demand must be supported by effective purchasing power – ultimately high-powered money – while for the conflict or post-Keynesian theorists, income claims must be supported by market power. The latter occurs when demand for the good or services and thus the source of income (wages, profits or taxes) is not totally elastic and there is no sudden end to demand if charges are raised above 'the' market level.

This paper considers conflict theories as an explanation for wage inflation in Australia during the 1990s. More specifically, the view that wage claims are spurred by three, oft times inconsistent, cultural workplace customs, is examined using a pseudo-panel data set of over 200 000 observations over the period 1989 to 2000. These norms, embraced by labour and sometimes upheld by employers, are that wage levels should be set with regard to first, comparative wages in peer occupations or industries, secondly, previously established levels of real income and thirdly, the willingness of the firm or industry to pay. As noted by Isaac (1977) and Kaldor (1996), the greater is the variance at the micro level between these three norms, the higher is the level of wage inflation for differences in these norms establishes and perpetrates a chain reaction of incompatible claims. While this study attempts to quantify the contributions from these sources, it does not test for whether the neoclassical interpretation of inflation is more plausible than the post-Keynesian interpretation. It is accepted that a reasonable level of

endogeneity of the money supply exists (see Burdekin and Burkett 1996 for a test of this hypothesis).

The second section of this paper outlines the model used to estimate the differential impact of the determinants of wage inflation, the third section describes the data used to estimate the model and reports the estimation results and the final section finishes with a short conclusion.

Partial adjustment model of wage levels

Most conflict models of inflation portray both price and wage setting behaviours and are almost exclusively concerned with conflict between aggregate labour and aggregate capital over real incomes. Workers' target nominal real wage is hypothesised to be governed primary by the expected price level, and, firms' target real price, by the expected level of nominal wages (Palley 1996, Rowthorn 1977, Lavoie 1992, Dalziel 1990). The rate of inflation in both wages and product prices is determined therefore by the disparity between these expectations and the strength of either party to enforce their preferences. The latter is commonly represented in applied research by the unemployment rate, the level of demand for labour, strike activity, union membership and so forth.

However, by focusing on the division of income between labour and capital, these theories marginalise the source of conflict that arises from the principles of comparative wage justice. These principles can act independently, or in contrast to, the principles of real wage resistance. Most of the macroeconomic models of inflation are sector or classed-based and accordingly have difficulty modelling wage-wage inflationary pressures.[1] This omission is considerable as the power of wage comparisons across related jobs in determining wage norms is a well

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[1] See Destefanis (1999) for an example of wage-wage estimations.

established part of the labour economics literature and is well acknowledged by industrial relations practitioners (see Dunlop 1944, Wood 1978). In general, the closest the literature comes to comparative wage models are wage leadership models, which combine comparative wage principles with an assumption of a 'key-industry', are usually tested using a time series approach.

In this paper, we attempt to model the effects of real wage resistance comparative wage justice and profit sharing principles using unit record data from household surveys in Australia from 1989 to 2000. Only the determination of nominal wages is considered and there is accordingly no explicit treatment of the price equation.

We start by assuming that the desired nominal wage, w^*, in period t for each occupation o, and industry i, can be represented as depending on both comparison with peer workers and customary real income levels. Accordingly:

$$w^*_{oi,t} = f\left(w^e_{ri,t}, w^e_{oj,t}, m^e_t, p^e_{z,t}, t\right), \tag{1}$$

where r represents all occupations other than o, j represents all other industries than i, m represent mark-ups on domestically produced goods and services, p_z are the prices of imports, t is a time trend and the superscript e is used to indicate expected levels. Wages are set with respect to first, the expected average wage levels in peer occupations – in this model – wages in the same industry but other occupations, and wages in the same occupation but other industries; secondly, the expected rise in the cost of living and thirdly, a positive trend in expected living standards. Insofar as the second group of factors differs from the wage rises received by other workers, this includes, domestic mark-ups (m) and the prices of imported goods (p_z).[2]

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[2] I.e. including the domestic consumer price index would involve some double counting with the two peer wage variables.

The realised wage outcome however, depends on how fully workers' preferences materialise and this is characterised as a partial adjustment model:

$$\frac{w_{oi,t}}{w_{oi,t-1}} = \left(\frac{w_{oi,t}^*}{w_{oi,t-1}}\right)^{\lambda_{oi,t}},$$

(2)

where $\lambda_{oi,t}$, the adjustment coefficient, reflects workers' power which potentially varies according to both occupation and industry. Taking logs of equation (2) yields:

$$\ln w_{oi,t} = \lambda_{oi,t} \ln w_{oi,t}^* + \left(1 - \lambda_{oi,t}\right)\ln w_{oi,t-1}.$$

(3)

According to the hypothesis proposed by Isaac and Kaldor, $\lambda_{oi,t}$, depends on the level of profits per worker in the relevant firm or industry at the time of bargaining but to generalise the model further, other factors such as the relevant unemployment rate can be included. Thus $\lambda_{oi,t}$ is assumed to depend upon a vector of explanatory variables, $z_{oi,t}$. It is straightforward to make the partial adjustment coefficient a function of $z_{oi,t}$ (see Maddala 1988, pp 351-352). Since, $0 \leq \lambda_{oi,t} \leq 1$, $\lambda_{oi,t}$ is modelled as a logistic function:

$$\lambda_{oi,t} = \left[\frac{1}{1 + \exp(-z_{oi,t}'\gamma)}\right],$$

(4)

Specifying the desired wage, w*

In what follows we represent expectational variables by the lagged value of the variable itself. This is consistent Keynes' view that when it is not possible to make future predictions based on mathematical calculation, rational firms will rely on conventions. A common convention is to assume that present circumstances will continue into the future, not because they believe this is probable, but because there is no reason, on balance, why it should change in one direction and not another (Keynes 1937). People base their estimates of the future states of the world on what

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they know for certain rather than highly speculative prophecies that they hold with little confidence. Additionally, the use of lagged variables as explanatory variables will minimise the possibility of endogeneity problems.

It follows that two variables to represent the expected wage level in comparative occupations are first, the lagged value of average wages in the same occupation but other industries and, secondly, the lagged value of average wages from other occupations in the same industry.

A threat to the habitual real wages of workers as a class, occurs when national income per worker falls – due perhaps to a rise in import prices or a reduction in productivity – or when there has been a shift of incomes from wage to profits. The relationship between consumer prices and apparent real wage resistance is not monotonic. A rise in consumer prices may not lead to real wage resistance if it resulted from successful wage claims by other workers, who are now satisfied. On the other hand, consumer prices increases resulting from a growth in import prices or profit mark-ups, is expected to lead to resistance.

To isolate and separate the forces that contribute to real wage resistance from its outcome, the expected aggregate profit mark-up, that is, the aggregate level of gross operating surplus per worker m, and the import price index, p_z are included in the $w*$ function. In addition, a time variable has been included to capture workers' expectations of a rising real incomes over time.

The use of aggregated variables to represent the forces of real wage resistance, effectively treats wage earners as a single class. By contrast, the variables to represent comparative wage justice are microeconomic and have been designed to relate specifically to the wage rate for each occupation and industry cell.

Finally we note that our model takes the form of a (pseudo) panel with groups defined by occupation and industry and we therefore include group fixed effects in our specification (Deaton 1985). Thus we specify w^* as:

$$\ln w^*_{oi,t} = \alpha_{oi} + \beta_1 \ln w_{ri,t-1} + \beta_2 \ln w_{oj,t-1} + \beta_3 \ln m_{t-1} + \beta_4 \ln p_{z,t-1} + \beta_5 time \qquad (5)$$

The fixed effects specification is attractive in that the model can be estimated by conventional least squares techniques after differencing the data. The differencing required is for each group (in our case, *oi* combination) the subtraction from each observation of the group mean. In what follows we will denote these differenced variables with the superscript *d*.

Specifying the partial adjustment coefficient, λ

Two variables are use to represent worker bargaining power, that is, the ability of workers to achieve their desired wage rate and these are associated with the industry or occupation of the dependent variable w_{oi}. The first is the unemployment rate, u, and is available for the nine major occupational categories. The second variable, which represents the ability of firms to pay, is the gross operating surplus per worker in each of the major 17 industries, π.[3] Thus we specify λ by:

$$\lambda_{oi} = \left[\frac{1}{1 + \exp\left(- \gamma_1 \ln u_{o,t-1} - \gamma_2 \ln \pi_{i,t-1}\right)} \right] \qquad (6)$$

where u is the unemployment rate and π is the level of profits per employee. Note that π is industry specific (1-digit level) while m the rate of profit per worker across the whole economy and accordingly only varies with time.

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[3] While we disaggregate these 17 industries into 32 industries for estimation of $w_{oi,}$ $w_{ri,}$ w_{oj} we cannot do this for estimate of gross operating surplus.

Final estimation equation

The final equation for estimation is obtained by taking first differences to eliminate the fixed effects in equation (5). We then substitute the specifications in (5) and (6) into equations (3) and (4) to yield:

$$\ln w_{oi,t}^{d} = \left(\frac{1}{1 + \exp\left(- \gamma_1 \ln u_{o,t-1} - \gamma_2 \ln \pi_{i,t-1}\right)} \right) \times$$
$$\left(\beta_1 \ln w_{ri,t-1}^{d} + \beta_2 \ln w_{oj,t-1}^{d} + \beta_3 \ln m_{t-1}^{d} + \beta_4 \ln p_{z,t-1}^{d} + \beta_5 time \right) \quad (7)$$
$$+ \left(1 - \frac{1}{1 + \exp\left(- \gamma_1 \ln u_{o,t-1} - \gamma_2 \ln \pi_{i,t-1}\right)} \right) \times \ln w_{oi,t-1}^{d}$$

The data

A pseudo-panel data set has been formed from 10 cross-sectional surveys of 201 044 full-time workers in Australia.[4] This included surveys from 1989 to 2000 excluding 1991 and 1996 when the relevant data was not collected. Cells of homogenous wage rates for particular jobs have been formed by collapsing the observations into 44 occupations and 32 industry groups to produce 1408 cells.[5] Many of these cells had no observations due to the natural correlation between occupation and industry, and, cells with less than 10 observations have been excluded. This reduces the number of homogeneous occupation by industry cells to between 263 and 338 in each year. The wage for each cell is the mean weekly wage for all observations in that cell.

Equation (4) is estimated using non-linear least squares. A linear approximation for (7) was also estimated using OLS. To adjust for change to the age and gender composition of each

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[4] ABS Employee Earnings, Benefits and Trade Union Membership, Australia, cat 6310.0. August various years.

[5] The 44 occupation are the 2-digit ASCO occupation codes. The industry groups are single digit ANZSIC groups supplemented by selected 2 digit groups where high concentration of an occupation permit further disaggregation.

pseudo-cell, the average age and gender of individuals included in each cell has also been included. The estimation is weighted by cell size.

Table 1: Dependent variable: nominal wages in specific occupation and industry – non-linear estimation

Explanatory variables (in logs except for time, age and sex)	Coef.	t	Coef.	t
LAMBDA				
Unemployment rate (occupation) –lagged	0.02	0.11		
Profits per employee (industry) – lagged	0.35	5.70	0.36	9.97
DESIRED WAGE				
Peer wages (other industries, same occupation) – lagged	0.32	8.52	0.32	8.53
Peer wages (other occupations, same industry) – lagged	0.25	7.58	0.25	7.59
Import price index – lagged	0.24	3.88	0.24	3.88
Time – squared	0.0005	12.74	0.0050	12.79
Average age of cell	0.01	6.41	0.01	6.42
Average gender of cell	-0.11	-4.24	-0.11	-4.24
R^2	0.67		0.67	
N	2338		2338	

The results for the non-linear estimation are presented in Table (1). Gross operating surplus per unit of output in the whole economy, m, was either incorrectly signed or insignificant in each equation and was henceforth excluded from the analysis. The occupational unemployment rates were not significant but the remaining variables were found to be significant and correctly signed.

Five variables were found to determine the desired wage, peer wages (other industries, same occupation and other occupations, same industry), the import price index and the trend variable.

The results from Table 1 imply that a 10 per cent rise in either of the peer wages, raised the desired wage by between 3.2 and 2.5 per cent. A ten per cent rise in the price index caused a 2.4 per cent rise in the desired wage. The time coefficient implies that by the end of the estimation period (2000), desired wages were 1.2 per cent higher than at year zero (1988), *ceteris paribus*. The elasticities in the linear approximation presented in Table 2 were slightly lower. For peer wages, the coefficients were 0.150 and 0.147, and, for the import price index, the coefficient was 0.208. In the non-linear estimation, lambda depended solely on gross operating surplus per employee. The estimated coefficient implies that a 10 per cent rise in gross operating surplus per employee in the relevant industry, will raise the adjustment coefficient lambda by 3.5 per cent. Evaluated at the mean (log) unemployment rate, lambda was 0.753 – that is, actual wages are increased by about three quarters of the gap between last period's wages and desired wages. The implied lambda from the linear approximation, being one minus the coefficient on the lagged wage, was 0.67.

While the unemployment rate was not significantly different from zero in the non-linear estimation, it was negative and significant in the linear approximation when the trend variable was excluded from the desired wage equation. While the non-linear specification and estimation method are the preferred specification, and there are no *a priori* grounds for excluding the time trend, there is a preference for rejecting the hypothesis that the unemployment rate has an effect on the partial adjustment coefficient. However, it should be noted that the data for the unemployment rate, pertains only to the major occupational group and is not as finely tuned as one would ideally prefer.

Table 2: Dependent variable: nominal wages in specific occupation and industry – linear estimation

Explanatory variables (in logs except for time, age and sex)	Coef.	t	Coef.	t
LAMBDA				
Unemployment rate (occupation) – lagged	-0.0003	-0.11	-0.0061	-2.08
Profits per employee (industry) – lagged	0.0025	1.30	0.0030	1.57
DESIRED WAGE				
Wages (same industry, same occupation) – lagged	0.33	17.05	0.36	18.92
Peer wages (other industry, same occupation) – lagged	0.15	6.11	0.21	9.35
Peer wages (other occupation, same industry) – lagged	0.15	6.11	0.22	9.80
Import price index – lagged	0.21	5.78	0.21	5.87
Time – squared	0.0005	6.63		
Average age of cell	0.01	7.61	0.01	8.15
Average gender of cell	-0.10	-4.09	-0.10	-3.77
Constant	-0.02	-2.46	0.01	2.35
R^2	0.81		0.81	
N	2338		2338	

Conclusion

The NAIRU family of theories filled the 'inflation' vacuum in macroeconomic models created by the demise of monetarism during the 1980s. However, since then, the persistent instability of the NAIRU has lead many economists to discount its value as the inflationary relationship in theoretical and applied models of the economy (see for example, Galbraith 1997). This study is forms part of a search for new quantifiable models of wage inflation.

We have found that once individual differences in a specific occupation and industry wage rate are held constant, the major determinants of the wage levels are wages in the same (2-digit) occupation, wages in the same major industry group and the import price index. Following the conflict theories of wage demands, we argue that higher peer wages leads to higher wage demands through workers' culturally held views of the morality of comparative wage justice and a higher price of imports creates higher wage demands because workers resist reductions in their living standards. Additionally, a higher level of profits per employee in the relevant industry was associated with higher wages and we argue that acts thought tilting the balance of power in workers during wage negotiations. However – and most important for analysists who rely upon the NAIRU – the level of occupational specific unemployment rates did not show a clear or consistent association with wage outcomes.

Our results suggest that attempts to control inflation through high levels of unemployment will be ineffective. Policy makers should instead concentrate on first, containing extraneous rises in wages, though perhaps culturally defined events and expectations and secondly, changing the cultural norms that lead to resistance in living standards when the terms of trade dictate that the size of income for the whole nation has fallen.

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