An Econometric Study of the Behaviour of Real Wages in Two French Industries

A T Flegg, J D Boardley, C D Webber and G C Mulvey[1]

Abstract

This paper examines the behaviour of real wages in the French textile and paper industries. The econometric analysis is embedded within the theoretical framework of the insider-outsider hypothesis. The models attempt to measure the impact of insiders and outsiders on real wages, and the part that insiders play in creating hysteresis in employment. The analysis uses a range of industry-specific and aggregate variables to measure the influence of insiders and outsiders. Quarterly data for the period 1972-97 are employed.

The econometric results indicate that both internal and external variables play a statistically significant role in explaining changes in real wages, and that the pure insider/outsider hypothesis can be rejected for both industries. As far as its authors are aware, this paper is the first to test for insider power in French industry.

1. Introduction

A POSSIBLE EXPLANATION for the persistence of high unemployment in Western Europe in recent decades is offered by the theory of insiders and outsiders. Here we make use of this theoretical framework, along with quarterly data for the period 1972-97, to examine the behaviour of real wages in two French industries: Textiles and Clothing, and Paper, Board and Packaging. These industries (hereafter abbreviated to textiles and paper) were chosen because of their contrasting performance, their economic importance and their differing market structures. Before examining these industries in detail, we briefly consider the changing nature of the French macroeconomic environment during the period under review.

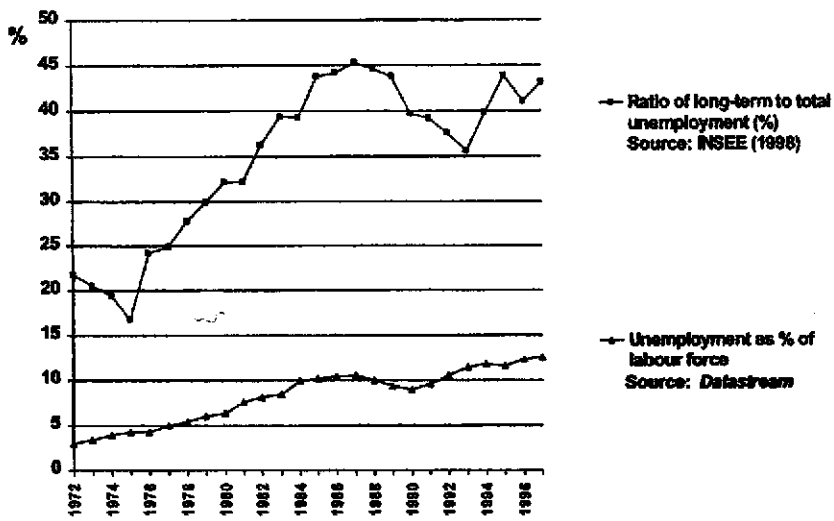
2. The macroeconomic environment

Following the relatively strict incomes policy of 1963-8, and the accompanying social upheaval of May 1968, the devaluation of August 1969 gave the French economy a much-needed stimulus and a sharper competitive edge. Moreover, the massive restructuring of the financial sector gave credit institutions, and particularly the banks, a solid basis for their future expansion. However, the government was unable to slow the expansion of liquidity and credit, and France was eventually forced to leave the European Snake in January 1974. France's macroeconomic problems at this time included rising interest rates and tenacious inflation.[2]

From 1978 to the end of 1985, France experienced a rate of unemployment that was consistently above the OECD average (INSEE, 1989). What is more, we can see from fig. 1 that this period was characterized by a sharp rise in the ratio of long-term to total unemployment (those unemployed for more than a year). By contrast, from 1986 to the end of 1990, France enjoyed the most consistent period of economic expansion since the 1960s. The rate of growth of GDP rose from less than two per cent per annum in the early 1980s (except for 1982) to a peak of 3.7 per cent in 1988 and 1989.

It is interesting that this period of enhanced economic growth coincided with an ideological *volte-face* by the Socialist government, which

Figure 1. Trends in aggregate French unemployment



included an acceptance of the need for corporate profitability.[3]

However, the buoyancy of the French economy in the period 1986-90 was not shared by the textile and paper industries. From 1986:1 to 1990:4, total production of textiles rose by just 8.7 per cent, compared with a rise of 57.5 per cent between 1981:1 and 1985:4. The paper industry fared even worse, with production rising by a mere 4.2 per cent from 1986:1 to 1990:4, compared to a staggering 65 per cent in the preceding five years. Let us now look at these industries in more detail.

3. *A tale of two industries*

3.1 L'industrie textile

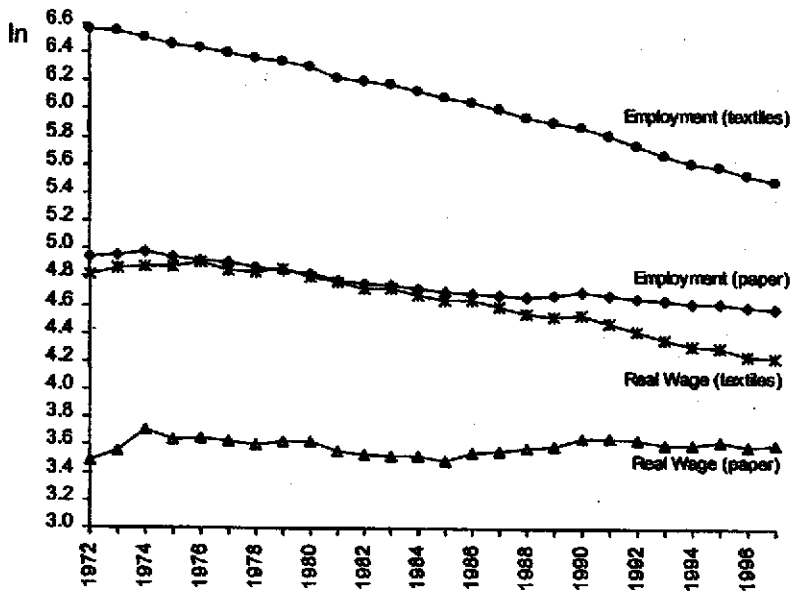
Textiles, one of France's oldest industries, has witnessed a dramatic decline. Fig. 2 illustrates the relentless fall in employment over the entire period. Moreover, since 1979, this shedding of labour has been accompanied by falling real wages.

Increased competition from developing countries and Eastern Europe has deepened the plight of France's textile industry. In addition, the industry has been slow to adopt new technology, enabling other less technologically advanced nations to compete through lower labour costs.[4] The fact that France's textile industry is under threat from this form of competition is illustrated in fig. 3[5]

Trade unions have scorned the recent trend toward 'decentralization', but have been powerless to halt it.[6] Owners of the largest textile firms have rejoined with the argument that decentralization has, if anything, saved jobs in the sector, reasoning that this was the only way in which the industry could save itself from bankruptcy. Though one of France's principal employers in the larger cities, the industry has never recovered from the commodity shocks of the 1970s. Changing demography has also reduced the demand for clothing, with the largest group of consumers, those aged 18-30, shrinking considerably in the 1990s.

From the end of the 1960s to the beginning of the 1980s, France's share of global textile production fell from six to three per cent; over the same period, the number of firms in the industry declined by 30 per cent, while domestic produc-

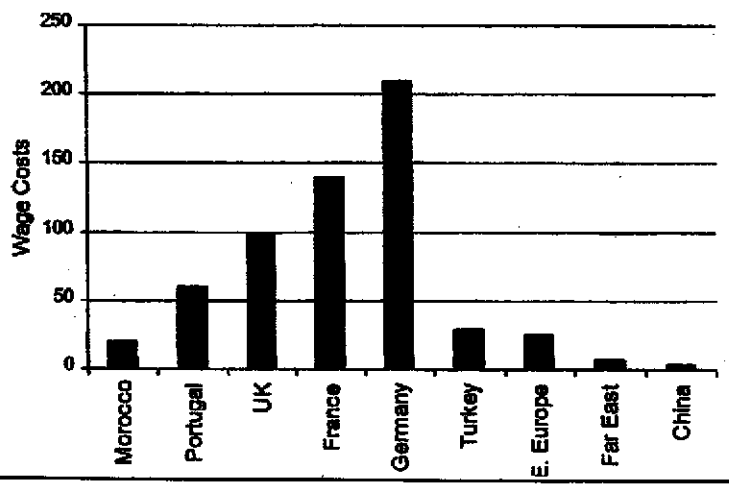
Figure 2. Employment and real wages in the French paper and textile industries.



tion and the number employed fell, respectively, by 15 per cent and 40 per cent. For some considerable time, the balance of trade in textiles has been in deep deficit owing to the inability of French textile firms to make a significant impact on export markets. Also, despite the industry's efforts to resist, import penetration has risen steadily.

In 1913, 42 per cent of all industrial workers were employed in textiles; by 1969, this figure had fallen to just 13 per cent. The decline in textiles is, however, part of a broader picture of deteriorating French industrial performance. The textile industry, once at the heart of the industrial

Figure 3. Textile wage costs in different countries (UK = 100).



revolution, is now the victim of France's inexorable deindustrialization.

3.2 L'industrie des papiers

The French are the second largest consumers of paper and board packaging in Europe. The French paper industry not only is the largest of its kind in Europe but also represents two per cent of France's GDP and seven per cent of its industry, and accounts for around one quarter of European production. Forecasters say that a boom in paper and packaging is the surest sign of a boom in industry, in much the same sense as construction is the bell-wether of the economy as a whole (MLI, 1995). That the paper industry is such a sound short-term indicator of industrial output is apparent when one considers its role in the economy: packaging is used in both mass-market products and heavy equipment. Moreover, industries that use paper and packaging must anticipate the sales of numerous packaged products, and most producers order their packaging some three months in advance. According to the Institut Français de l'Emballage et du Conditionnement (IFEC), the French paper industry has consolidated its position as the country's eighth largest industry, with a turnover of FF105 bn, 120,000 employees and 3,000 companies (MLI, 1995).

In the 1970s and early 1980s, the French paper industry experienced a dramatic decline, with real demand falling sharply from the close of 1973. However, in contrast to the continuing problems facing the French textile industry, the paper industry subsequently enjoyed a relatively healthy revival, particularly after 1985. Whilst textile production fell by about 20 per cent from 1985 to 1995, production in the paper industry rose over that period. COPACEL, the governing body of the paper industry, reports that the industry owes its rapid expansion to massive investment in the research and development of new products, and the aggressive development of new export markets (COPACEL, 1995). New technology has enabled the industry to expand its recycling market, so that, by 1995, recycled paper and board accounted for some 53 per cent of its input requirements of paper pulp.

Fig. 2 illustrates the clear downward trend in employment in the French paper industry, which was interrupted on only two occasions during the period 1972-97. Real wages in this industry exhibited both rises and falls during the period under review, and ended up higher in 1997 than in 1972. By contrast, we can see that real wages in the textile industry fell substantially during the period 1972-97. It is also evident that employment fell more rapidly in the textile industry than in the paper industry. It will be interesting to see what light the econometric analysis can shed on the contrasting behaviour of real wages in the two industries.

4. Hysteresis and the insider-outsider theory

The distinguishing feature of a hysteretic model, according to Røed (1997, p.393), is that its solution cannot be derived by using only current values of explanatory variables. To illustrate, suppose that an economy suffers an adverse shock such as a substantial rise in oil prices, and this is followed by a sharp rise in unemployment. If oil prices subsequently return to their original level but unemployment does not, then this would indicate the existence of hysteresis in the labour market. Under pure hysteresis, unemployment is dependent solely upon its past values, with coefficients summing to unity. However, the term hysteresis is often used more loosely to refer to a situation where there is a high degree of persistence in unemployment.[7] Indeed, the distinction between hysteresis and strong persistence is clearer in theory than it is in reality.[8] What is important is that, in both cases, unemployment is sensitive, even in the long run, to transitory shocks.

The insider-outsider approach is in essence New Keynesian, in that it views the labour market as being inherently imperfect (with price and wage rigidity and involuntary unemployment). What is more, such rigidities and imperfections

are not exogenously given, but can be explained in terms of factors endogenous to the model. Blanchard and Summers (1986, p.16) succinctly explain the essential ideas as follows:

> ... there is a fundamental asymmetry in the wage-setting process between insiders who are employed and outsiders who want jobs. Outsiders are disenfranchised and wages are set with a view to ensuring the jobs of insiders. Shocks that lead to reduced employment change the number of insiders and thereby change the subsequent equilibrium wage rate, giving rise to hysteresis. [The theory] can therefore explain the general tendency of the equilibrium unemployment rate to follow the actual unemployment rate.

We now need to clarify the distinction between insiders and outsiders. Following Lindbeck and Snower (1986), we may define three categories of worker:

- insiders, whose positions are safeguarded by significant turnover costs;
- entrants, who have recently acquired employment, with the hope of gaining insider status, but whose replacement would not generate significant turnover costs;
- disenfranchised outsiders, whose entry is restricted by the rent-seeking of incumbent insiders.

A fundamental assumption of insider-outsider theories is that insiders cannot be replaced by outsiders without incurring associated turnover costs. These costs - of hiring and firing - enhance insiders' bargaining power. This power will be greater, the greater the degree of non-substitutability of outsiders for insiders. Turnover costs may be classified as being either exogenous or endogenous; exogenous costs include, for example, mandatory severance pay and training costs, whereas endogenous costs arise from insiders' attempts to bolster their position (cf. Benassi *et al.*, 1994, pp.100-101). For instance, insiders might be able to negotiate more generous severance pay or they could refuse to co-operate with new entrants and thereby reduce their productivity. In both cases, the cost of replacing insiders with outsiders would rise.

5. Empirical evidence

Pioneering econometric work within the framework of the insider-outsider dichotomy, demonstrating the effects of lagged employment (and unemployment) on wage inflation, was carried out by Blanchard and Summers (1986). Using aggregate annual data for 1953-84, they concluded that the power wielded by insiders could explain the persistence of much higher unemployment in France, Germany and the United Kingdom compared to the United States. This conclusion was subsequently queried by Alogoskoufis and Manning (1988), but confirmed by Graafland (1989).

There is now a voluminous literature reporting the results of testing insider-outsider theories[9] Because different authors employ different types of data and testing frameworks, it is perhaps not surprising that conflicting findings have emerged.[10] On the whole, as noted by Lever (1995, p.271), lagged employment seems to have a relatively small impact on the wage rate. However, this does not necessarily mean that insider-outsider effects are absent, as these effects 'may be underestimated owing to sluggishness in labour demand and the persistence of exogenous shocks' (ibid.). It is worth noting too that external variables appear to be of greater relative importance in countries characterized by centralized wage bargaining (Holmlund and Zetterberg, 1991) and that the impact of internal variables tends to increase along with unions' bargaining power (Nickell and Kong, 1992).

6. Theoretical foundations

One of the principal features of insider-outsider theory is the marked difference in the status of insiders and outsiders. The 'membership rules' that govern the relationship between these two

groups, along with changes in employment, determine the size of the insider group.

In their classic study, Blanchard and Summers (1986) consider several possible ways of looking at membership rules. Following Mulvey (1997, pp.176-177), we consider these options with reference to the following simplified equation, which specifies the amount of employment sought, not by the firm, but by current insiders:[11]

$$n_{j,t}^* = \lambda_j n_{j,t-1} + (1 - \lambda_j) m_{j,t} \qquad (1)$$

where $n_{j,t}^*$ is the target level of employment in firm j in period t, $n_{j,t-1}$ is employment in the previous period, and $m_{j,t}$ represents the firm's potential labour force (comprising those who either are employed by the firm or would like to be). All variables are expressed as natural logarithms.

The parameter λ_j represents the proportion of new entrants and those recently laid off deemed to be outsiders. When $\lambda_j = 1$, complete hysteresis exists, so that insiders seek to maintain employment at the level prevailing in the previous period. Conversely, when $\lambda_j = 0$, there is no hysteresis and target employment coincides with the potential labour force.

Blanchard and Summers (1986, p.45) observe that, whilst hysteresis may arise in non-union contexts, it is more likely to occur where unions are strong. Unfortunately, data on union membership in France are sparse, and it is extremely difficult to derive a satisfactory empirical measure of union power. The rate of unionization among workers in France amounts at present to approximately nine per cent of the labour force.[12] Although union membership is low, French workers do vote massively in support of union-sponsored candidates in elections for workplace representatives and in choosing members on the bipartite labour courts (conseils des prud'hommes). Peculiar to the French system is the notion of representativeness, a legally defined concept, which endows unions with significant powers; for instance, a 'representative' trade union can enter into a collective agreement at any level with an employer. The agreement struck between the representative union and the employer (or employers' association) is then binding on all workers in the firm or industry, even when the union represents a relatively small proportion of the employees involved. Union coverage - the proportion of workers who are covered by union bargaining - amounts to over 80 per cent of the French labour force.

Furthermore, whether or not employees in an industry or firm are organized into a single union does not alter the fact that there exists a substantial asymmetry of information, as insiders are bound to have a greater knowledge of wages and the structure of wage bargaining. Under threat of wage cuts, non-union employees may well down tools in support of paid-up members,[13] taking advantage of the turnover costs associated with the employment of outsiders, or they may be covered by the agreements mentioned above.

In the light of the above discussion, it would seem that unions wield considerable power in French industry. The existence and exercise of this power should serve to reinforce any insider effects attributable to turnover costs.

Analogous to the employment function (1) is the following wage equation:

$$w_{j,t}^* = \mu_j w_{j,t-1} + (1 - \mu_j)\omega_t \qquad (2)$$

where $w_{j,t}^*$ is the target real wage and ω_t is the real wage obtainable elsewhere; μ_j measures the persistence of firm j's real wage. Insiders are faced with a decision regarding their wage and employment objectives and it is presumed that they will aim to minimize the difference between actual and desired values of wages and employment. Mulvey (1997, p.177) sets up this problem as a one-period quadratic loss function and derives an equation of the following form for the

actual real wage in firm j in period t:

$$w_{j,t} = w_{j,t}^* + \theta_j[n_{j,t} - \lambda_j n_{j,t-1} - (1 - \lambda_j)m_{j,t}] \quad (3)$$

where the term in square brackets is the difference between actual and target employment.

If we deem firm j to be representative of its industry, then equation (3) can be re-expressed as:

$$w_{i,t} = w_{i,t}^* + \theta_i[n_{i,t} - \lambda_i n_{i,t-1} - (1 - \lambda_i)m_{i,t}] \quad (4)$$

which shows that the real wage in industry i in period t is determined by the insiders' target real wage, the contemporaneous and lagged *levels* of employment in this industry, and the size of its potential labour force. In the special case of full hysteresis ($\lambda_i = 1$), we get the simplified model:

$$w_{i,t} = w_{i,t}^* + \theta_i \Delta n_{i,t} \quad (5)$$

which shows that the real wage in industry i is determined by the target real wage and the *change* in the industry's employment.

A problem with equation (4) as it stands is that an industry's potential labour force cannot easily be measured. However, this difficulty can be circumvented by making use of the approximation $m_{i,t} \cong n_{i,t} + U_{i,t}$, where $m_{i,t}$ and $n_{i,t}$ are the natural logarithms of the potential labour force and current employment, respectively, and $U_{i,t}$ is the rate of unemployment expressed as a decimal.[14]

We can now re-express equation (4) as:

$$w_{i,t} = \mu_i w_{i,t-1} + (1 - \mu_i)\omega_t + \theta_i\lambda_i\Delta n_{i,t} - \theta_i(1 - \lambda_i)U_{i,t} \quad (6)$$

Thus far we have considered only one side of the dichotomy that exists between insiders and outsiders. If insiders are workers employed in a particular industry, then outsiders comprise those unemployed in this industry or even those employed elsewhere. If insider-outsider theories provide a valid explanation of wage setting, then unemployed outsiders will exert little or no pressure on an industry's wage rates. In terms of equation (6), we would expect λi to be close to unity and the coefficient of $U_{i,t}$ to be close to zero.

Unfortunately, no industry-specific unemployment rates were available and it was necessary to use data on aggregate French unemployment to proxy the influence of outsiders. The use of this proxy can be justified on the basis that a fall in aggregate unemployment would increase the bargaining power of insiders in each industry. This is because a tight labour market would make it more difficult and expensive to replace insiders (cf. Røed, 1997, p.401). Insiders would also have enhanced employment opportunities elsewhere. Conversely, rising aggregate unemployment would tend to increase the power of employers. Hence we might expect to see a negative relationship between real wage rises in each industry and the aggregate unemployment rate.

The *duration* of aggregate unemployment is also likely to be important inasmuch as the long-term unemployed may be less active in searching for jobs and may be deemed to be less employable because of loss of skills, etc.[15] This duration effect can be measured by using the ratio of long-term to total unemployment. The higher this ratio, at any given rate of aggregate unemployment, the more powerful insiders are likely to be. This is because the long-term unemployed tend to have minimal impact on wage bargaining. Hence a positive relationship between real wages and the proportion of long-term unemployment can be anticipated.

7. The econometric model

The primary aim of the econometric analysis is to model the dynamic behaviour of real wages in the two industries and, to achieve this aim, some modifications need to be made to the theoretical model developed in the previous section. First,

let us subtract $w_{i,t-1}$ from both sides of equation (6) to get:

$$\Delta w_{i,t} = -(1 - \mu_i)w_{i,t-1} + (1 - \mu_i)\omega_t + \theta_i\lambda i\Delta n_{i,t} - \theta_i(1 - \lambda_i)U_{i,t} \qquad (7)$$

Secondly, on the right-hand side of equation (7), let us add and subtract $\theta_i(1 - \lambda_i)U_{i,t-1}$ and then perform a similar exercise with $(1 - \mu_i)\omega_{t-1}$. This yields the equation:

$$\Delta w_{i,t} = (1 - \mu_i)\Delta\omega_t + \theta_i\lambda_i\Delta n_{i,t} - \theta_i(1 - \lambda_i)\Delta U_{i,t} - \theta_i(1 - \lambda_i)U_{i,t-1} + (1 - \mu i)(\omega_{t-1} - w_{i,t-1}) \qquad (8)$$

The refinements introduced so far have not gone beyond manipulations of the original theoretical equation. However, an obvious shortcoming of equation (8) is that it fails to include the industry-specific rate of growth of output per worker. In addition, we need to take account of the absence of data on industry-specific unemployment rates. Here we follow Nickell and Wadhwani (1990) in using a logarithmic transformation of the aggregate unemployment rate, along with the ratio of long-term to total unemployment, to capture pressures emanating from the external labour market. The use of $u_t \equiv \ln Ut$ as the regressor is also consistent with the presumption that the theoretical relationship between the rate of growth of real wages and the rate of unemployment is non-linear.

Another issue is whether to use annual or quarterly data. The use of quarterly data has two principal merits: the fourfold increase in sample size and the possibility of establishing a more exact lag structure. A major disadvantage is, of course, the greater likelihood of encountering serious autocorrelation. Nonetheless, it was decided to use the following augmented quarterly variant of equation (8) as the basic regression model:

$$\Delta w_{i,t} = \alpha + \beta_1\Delta\omega_t + \beta_2\Delta n_{i,t} + \beta_3\Delta u_t + \beta_4 u_{t-4} + \beta_5 LTU_{t-4} + \beta_6(\omega_{t-4} - w_{i,t-4}) + \beta_7(\Delta q_{i,t} - \Delta n_{i,t}) + \varepsilon_{i,t} \qquad (9)$$

where Δw is the proportionate change in industry-specific real wages; $\Delta\omega$ is the proportionate change in real wages for French manufacturing as a whole; Δn is the proportionate change in industry-specific employment; u is the natural logarithm of U, the aggregate rate of unemployment in France, so that Δu is the proportionate change in U; LTU is the *ratio* of long-term to total unemployment in France; $\omega - w$ is the natural logarithm of the ratio of manufacturing to industry-specific wages; and $\Delta q - \Delta n$ is the industry-specific rate of growth of output per worker.

Underlying this regression model is the presumption that there is a strong link between the real wage in each industry and that in French manufacturing as a whole. The real wage in each industry is also assumed to be influenced by changes in industry-specific employment and productivity. With respect to aggregate unemployment, the model identifies three possible links. The first is that rising aggregate unemployment may make insiders more cautious in demanding large wage increases and vice versa, so that we should expect $\beta_3 < 0$. The second link is via the lagged rate of unemployment. Here again there should be an inverse relationship, so that $\beta_4 < 0$. The third link is the presumed positive, but lagged, relationship operating through LTUt-4.

Some comments are called for with regard to the regressor $\omega t-4 - w_{i,t-4}$, which equals the logarithm of the ratio of the lagged manufacturing wage to the lagged industry-specific wage. One might expect $\beta_6 > 0$ since departures from some target value of this ratio would set in motion forces to restore the 'equilibrium' value. This is because workers are likely to be concerned not only with the proportionate size of the current

wage rise on offer but also with their wage relative to that in manufacturing, as determined in the previous set of negotiations. Assuming a contract length of one year (cf. Graafland, 1989, p.105), it is the relative wage in quarter t-4 that is likely to be relevant.

Given the use of quarterly data, it is a simple process to check the validity of the lags included in equation (9), as well as the absence of lags on certain variables. It is worth noting too that the regression model has been formulated in such a way that it is possible to discriminate relatively easily between alternative hypotheses. For instance, we can create a pure insider-outsider model by imposing the restrictions $\beta_3 = \beta_4 = \beta_5 = 0$, which imply that unemployed outsiders play no role in determining the wage in each industry. If these restrictions were supported by the data, then this would provide strong support for the pure insider-outsider hypothesis. A number of other nested models can also be created by imposing suitable restrictions on the parameters of equation (9).

8. Testing for stationarity

Before attempting to estimate the parameters of equation (9), we need to check whether the variables are stationary, as the inclusion in the regres-

Table 1: Testing for stationarity

	k	trend?	test statistic	critical value	stationary?
Paper industry					
$w_{i,t}$	1	no	-3.17	-2.89	yes
$\Delta w_{i,t}$	0	no	-4.43	-2.89	yes
$\Delta n_{i,t}$	0	no	-6.65	-2.89	yes
$\omega_{t-4} - w_{i,t-4}$	4	no	-1.19	-2.89	no
$\Delta\omega_{t-4} - \Delta w_{t-4}$	3	no	-5.96	-2.89	yes
$\Delta q_{i,t} - \Delta n_{i,t}$	3	yes	-7.31	-3.46	yes
Textile industry					
$w_{i,t}$	2	yes	-2.77	-3.46	no
$\Delta w_{i,t}$	1	no	-5.43	-2.89	yes
$\Delta n_{i,t}$	3	yes	-5.84	-3.46	yes
$\omega_{t-4} - w_{i,t-4}$	4	no	+2.21	-2.89	no
$\Delta\omega_{t-4} - \Delta w_{t-4}$	4	no	-4.28	-2.89	yes
$\Delta q_{i,t} - \Delta n_{i,t}$	1	yes	-8.91	-3.46	yes
External variables					
$\Delta\omega_t$	4	no	-3.12	-2.89	yes
Δu_t	0	yes	-4.78	-3.46	yes
u_{t-4}	3	no	-4.20	-2.89	yes
LTU_{t-4}	4	no	-1.42	-2.89	no
$lnLTU_{t-4}$	4	no	-1.57	-2.89	no
$ltur_{t-4}$	4	no	-3.99	-2.89	yes
$\Delta^2 p_t$	2	no	-8.23	-2.89	yes

sions of non-stationary variables could produce spurious results. Following Thomas (1997, p.374), we define a stationary time series as one whose mean, variance and covariances remain constant over time. Given that most of the variables in equation (9) enter in the form of first differences in logarithms, non-stationarity is unlikely to pose too much of a problem.[16] However, we do need to look carefully at the regressors u_{t-4}, LTU_{t-4} and $\omega_{t-4} - w_{i,t-4}$.

In testing for stationarity, we ran simple and augmented Dickey-Fuller regressions for each variable in turn, including an intercept, a trend and up to four lagged differences ($k = 4$). We then chose one of these DF or ADF regressions for further analysis.[17] This choice was made on the basis of various model-selection criteria and by referring to a χ^2 test statistic for autocorrelation.[18] Finally, we used the sequential procedure recommended by Holden and Perman (1994, pp.62-66) to establish whether a deterministic trend was required. Table 1 reports the outcome of this procedure.

The results for the paper industry show that the DF or ADF statistics are well above their critical values at the five per cent level for $\Delta w_{i,t}$, $\Delta n_{i,t}$ and $\Delta q_{i,t} - \Delta n_{i,t}$, but there is a serious problem with regard to $\omega_{t-4} - w_{i,t-4}$. However, the first difference of this latter variable is clearly stationary. The same pattern occurs for the textile industry. It is interesting that $w_{i,t}$ is stationary for the paper industry but not for the textile industry.

The external variables present a more mixed pattern. $\chi^2 p_t$ is clearly stationary. $\Delta\omega_t$ is more of a marginal case because the ADF statistic is not convincingly above its critical value. However, given the difficulty in choosing an appropriate DF or ADF regression, it is perhaps worth noting that this variable passed the stationarity test for nine out of the ten regressions considered. The unemployment variables present some interesting contrasts. Whilst u_{t-4} is stationary, neither LTU_{t-4} nor its natural logarithm is stationary. For this reason, a new proxy to capture the duration effects of long-term unemployment was constructed. This is $ltur_{t-4}$, the natural logarithm of the long-term unemployment rate, which is clearly stationary.

Whilst the use of $ltur_{t-4}$ in the regressions needs no further explanation, some justification is needed for the proposed replacement of $\omega_{t-4} - wi_{t-4}$ with $\Delta\omega_{t-4} - \Delta w_{i,t-4}$. This is because we are altering a fundamental hypothesis. Instead of the growth of real wages in quarter t being determined, at least to some extent, by the logarithm of the lagged *ratio* of manufacturing to industry-specific wages, we are now stating that what matters is the difference in the rates of growth of such wages. This may well be a more realistic way of viewing the determination of wages.

9. *Regression results*

9.1 Paper industry

Regression [1] in table 2 shows the results of fitting the modified version of equation (9) to quarterly data, seasonally adjusted, for the period 1973:2 to 1997:4. Sources, definitions and an explanation of the diagnostic statistics are given in the Appendix. In considering these results, it should be borne in mind that all regressors, except for u_{t-4} and Δut, should have positive coefficients.

Regression [1] has a fairly good fit and some excellent t ratios. In addition, all regression coefficients have their anticipated signs. However, the regression fails two of the four diagnostic χ^2 tests. It is evident that the residuals are autocorrelated and do not follow a normal distribution.

To address these problems, and to try to improve the goodness of fit, a lagged dependent variable was added to the regression. We can see from regression [2] that $\Delta w_{i,t-1}$ is highly statistically significant and its estimated coefficient is positive, as expected.[19] Moreover, the use of this

new regressor has produced a better fit and also appears to have solved the problem of autocorrelation. Unfortunately, far from removing any skewness or kurtosis in the residuals, the respecification has aggravated this problem.

An inspection of the residuals from regression [2] indicated that the results were being distorted by the abnormally rapid rise in nominal wages that occurred in the paper industry in 1973-4. To take account of this atypical period, a binary variable, B734, was added to the regression. This equals unity in 1973:3, 1973:4 and 1974:1, and zero otherwise.[20] Another binary variable, B82, was also included to adjust for an anomaly in 1982:1, when the recorded rise in nominal wages was only 0.1 per cent, compared to 3.0 and 4.0 per cent, respectively, in 1981:4 and 1982:2.

Table 2: Regression results for the paper industry

	Regressand: $\Delta w_{i,t}$			
	[1]	[2]	[3]	[4]
Intercept	-0.011	-0.007	0.002	-0.001
	(-2.18)	(-1.54)	(0.47)	(-0.26)
$\Delta n_{i,t}$	0.817	0.573	0.568	0.549
	(5.75)	(4.06)	(4.99)	(3.49)
$\Delta \omega_t$	0.450	0.387	0.471	0.493
	(3.24)	(3.04)	(4.57)	(3.73)
$\Delta \omega_{t-4} - \Delta w_{i,t-4}$	0.233	0.268	0.243	0.316
	(2.99)	(3.74)	(4.18)	(4.61)
u_{t-4}	-0.073	-0.056	-0.037	-0.055
	(-5.31)	(-4.27)	(-3.37)	(-3.47)
$ltur_{t-4}$	0.046	0.036	0.026	0.037
	(5.05)	(4.13)	(3.55)	(3.63)
Δu_t	-0.059	-0.045	-0.027	-0.027
	(-1.80)	(-1.49)	(-1.09)	(-1.02)
$\Delta q_{i,t} - \Delta n_{i,t}$	0.064	0.040	0.034	0.024
	(3.04)	(2.00)	(2.11)	(1.19)
$\Delta w_{i,t-1}$		0.324	0.277	0.304
		(4.38)	(4.63)	(4.19)
B_{734}			0.021	0.017
			(4.77)	(3.56)
B_{82}			-0.031	-0.031
			(-5.32)	(-5.06)
N	99	99	99	67
R^2	0.671	0.729	0.829	0.862
$\bar{R}^2$	0.646	0.705	0.810	0.838
$\chi^2(4)$ [auto]	13.0	2.8	5.2	5.9
$\chi^2(1)$ [func]	1.2	2.0	0.1	0.4
$\chi^2(2)$ [norm]	28.2	42.7	0.1	0.8
$\chi^2(1)$ [het]	2.6	1.1	0.1	0.3

Regression [3] shows the consequences of including the two binary variables. Both have highly significant coefficients, with the anticipated signs, and there is a marked improvement in the goodness of fit. The model is now able to explain almost 83 per cent of the fluctuations during the period 1973:2 to 1997:4 in the rate of growth of real wages in the paper industry. What is more, the $\chi^2(4)$ [auto] statistic is comfortably below its critical value at the five per cent level and the remaining three χ^2 diagnostic statistics are close to zero.

All estimated coefficients in regression [3] have their correct signs. It is worth noting too that seven of the regressors are significant at the 0.05 per cent level, one is significant at the 0.1 per cent level, and another at the 2.5 per cent level. In fact, Δu_t is the only regressor with a modest *t* ratio.

Since the precise length of the lags cannot be determined *a priori*, the lags on $\Delta\omega_{t-4}$ - Δw_{t-4}, u_{t-4} and $ltur_{t-4}$ were first reduced to three quarters and then increased to five quarters. In both cases there was a dramatic fall in the size of the *t*-ratios for these regressors and a marked deterioration in R^2. These findings suggest that the lags used in equation [3] are appropriate. Furthermore, the absence of a lag on Δn_t was supported by the fact that the *t*-ratio fell from 4.99 to 0.45 when Δn_t was replaced by Δn_{t-1}.

As a further check on the robustness of the results, the model was refitted to a subset of data, 1973:2 to 1989:4 (N = 67). Notwithstanding the exclusion of one third of the observations, we can see from table 2 that the signs of the regression coefficients are unchanged and that $\Delta q_{i,t}$ - $\Delta n_{i,t}$ is the only regressor adversely affected by the change in the period of estimation. What is more, Chow's test for predictive failure gave no grounds for doubting the homogeneity of the full sample period, 1973:2 to 1997:4 (F = 0.8).[21]

9.2 Textile industry

Modelling the behaviour of real wages in the textile industry presented some difficulties. Preliminary regressions indicated that two lagged terms in the regressand were needed to capture the inertia in the evolution of real wages in this industry, and to purge the residuals of autocorrelation. A selection of the results obtained is displayed in table 3.

Although regression [1] performs very well in terms of three of the diagnostic χ^2 tests, it clearly fails the test for normality. However, an examination of the residuals did not suggest any obvious outliers. Also, two of the regression coefficients have unexpected signs and their t ratios are close to zero. These problems, along with the relatively low value of R^2, suggest that one or more important regressors may have been omitted.

Regression [2] shows the consequences of adding a variable which measures whether the rate of inflation is rising or falling between quarters t-1 and t. The hypothesis here is that a lack of bargaining power may mean that textile workers are unable to gain full compensation for price rises, so that their real wages tend to fall in periods of rising inflation and vice versa.

We can see from regression [2] that $\Delta^2 p_t$ is highly statistically significant and its estimated coefficient is negative, as expected. Moreover, the use of this new regressor has produced a much better fit and also successfully addressed the problem of skewness or kurtosis in the residuals. Unfortunately, the respecification has introduced a fresh problem in terms of autocorrelation.

An interesting facet of regression [2] is the fact that $\Delta\omega_t$ now has a near-zero *t* ratio, whereas this regressor is highly significant in regression [1]. It would seem that the exclusion of $\Delta^2 p_t$ from regression [1] introduces a large positive bias into the estimated coefficient of $\Delta\omega_t$, which vanishes once this omitted variable is added to regression [2]. A similar explanation can be adduced for the change in the size of the estimated coefficient of

$\Delta w_{i,t-1}$, although this time the bias is likely to be negative.[22] Little change occurs in the size of the remaining regression coefficients because the regressors in question have negligible correlations with $\Delta^2 p_t$.

In contrast to the highly significant results obtained for the paper industry, both u_{t-4} and $ltur_{t-4}$ have low *t* ratios in regression [2]. This can be explained by their strong collinearity (r = 0.992), together with their almost identical correlations with $\Delta w_{i,t}$ (-0.357 and -0.358, respectively). Statistically speaking, these two variables are

Table 3: Regression results for the textile industry

	Regressand: $\Delta w_{i,t}$				
	[1]	[2]	[3]	[4]	[5]
Intercept	-0.011	-0.012	-0.012	-0.012	-0.013
	(-2.34)	(-3.07)	(-3.00)	(-3.04)	(-2.53)
$\Delta n_{i,t}$	0.404	0.245	0.224	0.225	0.195
	(2.24)	(1.49)	(1.38)	(1.40)	(0.86)
$\Delta \omega_t$	0.295	-0.023	-0.038		
	(2.83)	(-0.20)	(-0.34)		
$\Delta \omega_{t-4} - \Delta w_{i,t-4}$	0.194	0.146	0.140	0.145	0.144
	(2.68)	(2.24)	(2.16)	(2.30)	(1.90)
u_{t-4}	-0.012	-0.012	-0.004	-0.004	-0.005
	(-1.26)	(-1.41)	(-2.91)	(-3.04)##	(-2.54)
$ltur_{t-4}$	0.005	0.005			
	(0.89)	(0.88)			
Δu_t	0.004	-0.023	-0.023	-0.021	-0.024
	(0.17)	(-1.09)	(-1.07)	(-1.05)	(-0.97)
$\Delta q_{i,t} - \Delta n_{i,t}$	-0.002	0.003	0.003		
	(-0.07)	(0.17)	(0.14)		
$\Delta w_{i,t-1}$	0.641	0.924	0.934	0.922	0.930
	(5.93)	(8.24)	(8.39)	(9.04)	(7.39)
$\Delta w_{i,t-2}$	-0.369	-0.403	-0.402	-0.403	-0.435
	(-3.72)	(-4..56)	(-4.55)	(-4.64)	(-3.92)
$\Delta^2 p_t$		-0.749	-0.752	-0.722	-0.705
		(-4.93)	(-4.96)	(-5.88)	(-4.31)
N	99	99	99	67	67
R^2	0.617	0.700	0.697	0.697	0.669
$\bar{R}^2$	0.578	0.666	0.666	0.673	0.629
$\chi^2(4)$ [auto]	3.6	10.5	7.2	7.4	6.3
$\chi^2(1)$ [func]	0.1	3.6	3.3	2.7	2.7
$\chi^2(2)$ [norm]	8.8	2.0	1.9	1.8	0.9
$\chi^2(1)$ [het]	1.8	3.5	3.6	3.5	1.7

almost interchangeable.[23] However, from a theoretical perspective, u_{t-4} has the merit of incorporating the effects of both short-term and long-term unemployment. Regression [3] reveals that the *t* ratio for u_t more than doubles once $ltur_{t-4}$ is excluded. A more surprising consequence is the fact that the χ^2 (4) [auto] statistic now falls below its critical value at the five per cent level.

We are now in a position to consider possible simplifications of the model. Two obvious candidates for exclusion are $\Delta\omega_t$ and $\Delta q_{i,t} - \Delta n_{i,t}$, which have near-zero *t* ratios. Using a standard *F* test, the restriction that both regressors have zero coefficients clearly cannot be rejected ($F = 0.1$). From regression [4], one can see that the exclusion of these two variables causes a small rise in $\bar{R}^2$ but not much change in the coefficients of the remaining regressors or their *t* ratios. Therefore, in the light of Occam's principle, it would seem sensible to simplify the regression in this way.

As in the case of the paper industry, checks were made on the validity of the lags used in regression [4]. With regard to $\Delta\omega_{t-4} - w_{i,t-4}$, it was found that a lag of one year was clearly optimal. However, for u_{t-4}, a lag of nine months gave slightly better results, whereas a lag of fifteen months generated worse results. Finally, the absence of a lag on Δn_t was supported by the fact that the *t* ratio fell from 1.40 to 0.72 when Δn_t was replaced by Δn_{t-1}. Taken as a whole, these findings do not provide any compelling reasons for altering the lags used in regression [4].

Regression [4] clearly satisfies the usual economic and statistical criteria for evaluating an econometric model. However, as a further check on the validity of the results, the model was refitted using the subsample used earlier, 1973:2 to 1989:4. The results are presented in regression [5]. It is evident that regressions [4] and [5] are very similar indeed.[24] This impression of a homogeneous study period was strongly confirmed by Chow's test for stability of coefficients ($F = 0.8$).

10. Insiders versus outsiders

Let us now examine how far the results lend support to the insider-outsider theory. On *a priori* grounds, it would seem that insider power, if it exists, is more likely to be present in the highly concentrated textile industry than in the more fragmented and competitive paper industry.[25] However, this thesis is undermined by the fact that it is the paper industry which exhibits the strongest link between industry-specific real wages and industry-specific employment. Moreover, it is evident that workers in the paper industry were more successful in achieving wage increases comparable to those obtained elsewhere in manufacturing. Indeed, it is clear that workers in the textile industry even had difficulty in maintaining their real wages in times of accelerating inflation.

Over the period 1973:2 to 1997:4, productivity in both industries grew at an average rate of 2.2 per cent per annum, yet the regression results suggest that it was workers in the paper industry alone who benefited from this enhanced efficiency. Indeed, nominal wages in the paper industry grew at an average rate of 1.6 per cent per annum over the sample period, whereas nominal wages in the textile industry grew at an annual average rate of only 0.9 per cent. This again is indicative of greater insider power in the paper industry.

Now consider the role of aggregate unemployment. French unemployment rose relentlessly from 2.2 per cent in 1973 to 14.0 per cent in 1993-4. By 1997, it had fallen slightly to 13.6 per cent. The regression results show that this secular rise in unemployment had a depressive effect on the growth of real wages in both industries. However, this effect was much larger in the paper industry, which suggests that unemployed outsiders had a greater influence on real wages in this industry.

Unfortunately, the lack of data on industry-specific unemployment rates means that it is impossible to provide accurate estimates of the degree of hysteresis in employment in the two industries.

However, if we accept that unemployed outsiders had a greater influence on real wages in the paper industry, then this would indicate a lower degree of hysteresis in this industry.[26]

In summary, the regression results do not offer a clearcut answer as to which industry was most affected by insider power. What is clear, however, is that both internal and external variables play a significant role in both industries. In this sense, the pure insider-outsider theory must be rejected. It is evident too that the relative importance of the various variables differs between the two industries.

11. Possible improvements

The present study is part of a continuing programme of research and it is worth considering what improvements might be made in future work. The first point concerns goodness of fit. Given that $1 - R^2 = 0.171$ for the paper industry and 0.303 for the textile industry, it is evident that there is some scope for introducing new regressors. One factor which may be important is the profitability of each industry. Where insiders are powerful, one might expect a strong positive association between profits and real wages to exist. It also seems worthwhile to explore the possibility of including some measure of workers' militancy in pursuing wage claims, perhaps one based on working days lost in industrial disputes. In terms of macroeconomic variables, the ratio of net social security benefits to net wages (the replacement ratio) is worth considering. The more generous such benefits, the greater the pressure on wages.

Although there is clearly scope for improving the goodness of fit of the regressions for both industries, we need to recognize that the relatively poor fit obtained for the textile industry is, to a large extent, a statistical quirk. This occurs because the rate of growth of real wages in the textile industry was relatively stable during the sample period, but fluctuated greatly in the paper industry. Hence the total sum of squares is much lower for the textile industry than it is for the paper industry. There is not, in fact, much difference in the residual sums of squares for the two industries.[27]

The second area where improvements might be made is in terms of econometric methodology. The econometric approach that has been pursued here has been eclectic in nature. Initially a long-run equilibrium model was derived using the theoretical framework offered by the insider-outsider hypothesis. This model was then modified to take dynamic considerations into account. This second stage of the model building made use of a dynamic structure similar to that used in many error-correction models. In the third stage, the potential regressors were tested for stationarity and some further modifications were made to the model. Finally, a general-to-specific approach was adopted to derive the best possible regression equation for each industry.[28]

The question might be raised as to why we did not test our long-run equilibrium model for cointegration and then use the lagged residuals from this cointegrating regression as an error-correction term in our dynamic equation. This Granger-Engle two-step approach has been used many times before and it clearly has some attractions.[29] However, it could not be adopted here because several of the variables that clearly should be included in a sensible long-run equilibrium model are, in fact, stationary. A case in point is the logarithm of the real wage for the paper industry (see table 1). Such I(0) variables cannot be included in a cointegrating regression.[30] Notwithstanding these problems, it would be interesting to explore how better use could be made of long-run relationships in modelling the dynamic behaviour of real wages.

12. Conclusion

This paper has examined the behaviour of real wages in the French textile and paper industries, using quarterly data for the period 1972-97. The econometric analysis was embedded within the

theoretical framework of the insider-outsider hypothesis. A range of industry-specific and national variables was used to measure the influence of insiders and outsiders. The internal variables included industry-specific employment and productivity, whereas the external variables included the overall French unemployment rate, the long-term unemployment rate in France, and the real wage in French manufacturing. These variables were lagged where appropriate. The econometric models satisfied all of the usual economic and statistical criteria.

Although the regression models had several common features, there were also a number of notable differences. A highly significant negative relationship was found between the overall unemployment rate and the rate of growth of real wages in both industries, whereas productivity and the long-term unemployment rate were statistically significant only in the case of the paper industry. The rate of growth of real wages in the paper industry was found to be strongly linked to fluctuations in employment in this industry, and to the growth of real wages elsewhere in manufacturing.

A high degree of inertia was discerned in the textile industry, with the evolution of real wages depending strongly on previous values. The results indicated that workers in this industry had difficulty in maintaining their real wages in periods of accelerating inflation. The link with real wages elsewhere in manufacturing was also found to be much weaker than in the paper industry.

No clearcut answer emerged as to which industry was most affected by insider power. This finding is rather surprising since the French paper industry is very fragmented and competitive, whereas the textile industry is highly concentrated. No statistical support for the pure insider-outsider hypothesis was found for either industry.

Appendix

Definitions

$w_{i,t}$: the natural logarithm of the industry-specific real wage

$\Delta w_{i,t}$: the proportionate change in the industry-specific real wage

ω_t: the natural logarithm of the average real wage in the French manufacturing sector

$\Delta\omega_t$: the proportionate change in the average real wage in the French manufacturing sector

$n_{i,t}$: the natural logarithm of industry-specific employment

$\Delta n_{i,t}$: the proportionate change in industry-specific employment

U_t: the proportion of the national labour force unemployed in France

u_t: the natural logarithm of U_t

LTU_t: the ratio of long-term to total unemployment in France (the proportion unemployed for more than one year)

$ltur_t$: the natural logarithm of the long-term unemployment rate in France (this rate equals $LTU_t \times U_t$)

$\Delta q_{i,t} - \Delta n_{i,t}$: the proportionate change in industry-specific productivity (output per worker)

Δp_t: the proportionate change in the French consumer price index

$\Delta^2 p_t$: the first difference in Δp_t

B_{734}: a binary variable equal to unity in 1973:3, 1973:4 and 1974:1, and to zero otherwise

B_{82}: a binary variable equal to unity in 1982:1, and to zero otherwise

Notes: The subscripts i and t refer to industry i and quarter t, respectively. Natural logarithms are written in lower case. The first differences in the logarithms of variables are not expressed as percentages. All variables are seasonally adjusted. Gross wages were measured in French francs and deflated using the French consumer price index. Employment was measured in thousands.

Sources

The following sources were used, inter alia, to provide contextual information about the French economy: Brunel and Saglio (1984), Charrié (1995), Ferron (1991), Holcblat and Husson (1990), OECD (1985).

Annual data on the ratio of long-term to total unemployment were obtained from INSEE (1998). These annual figures were first adjusted to take account of some differences in the month of collection and then converted to quarterly data by linear interpolation.

For all other variables, the data required were obtained directly from Datastream.

Diagnostic statistics

Amemiya's R^2 is based on the principle of minimizing the mean squared prediction error due to the incomplete specification of a regression model (Amemiya, 1980). In contrast to R^2, which will rise whenever a new regressor has a $|t| > 1$, R^2 imposes a more rigorous threshold for an improved fit. It was computed using the formula: $R^2 = 1 - (1 - R2)[(N - 1 + K)/(N - K)]$, where K is the number of parameters being estimated. $\chi^2(4)$ [auto] is the LM test statistic for autocorrelation up to order four. $\chi^2(1)$ [func] is Ramsey's RESET test statistic for mis-specification, based on the square of the fitted values. $\chi^2(2)$ [norm] is the Jarque-Bera test statistic for normality of the residuals. $\chi^2(1)$ [het] is an LM test statistic for heteroscedasticity, based on a regression of the squared residuals on the squared fitted values. The critical values at the 5% level are as follows: 9.5 for $\chi^2(4)$ [auto]; 3.8 for $\chi^2(1)$ [func] and $\chi^2(1)$ [het]; 6.0 for $\chi^2(2)$ [norm]. See Thomas (1997) for a good explanation of these χ^2 tests.

Method of estimation

All equations were fitted using *Microfit* and OLS.

Endnotes

1. University of the West of England. We are indebted to Guy Judge, John Sloman, Richard O'Doherty and Greg Mahony for helpful suggestions. We would also like to thank two anonymous referees for their comments.

2. The bank base rate rose to 12.45 per cent in 1974 and reached 17 per cent in 1980, following the second oil price shock. Annual inflation exceeded 10 per cent from 1974 and did not fall below this rate until 1983.

3. To paraphrase Zinsou (1985, p.61), the government went from the idea of breaking with capitalism to the palpably different idea of breaking with the failures of capitalism.

4. The French paper industry faces a similar threat; Martin Glass, a UK consultant, predicted that mill capacity in Asian countries, which face lower costs, will soon outstrip demand, leading inevitably to penetration into the European market. Source: Bernard Simon, 'Expanding Asian Mills Seen as Disruptive Force', *Financial Times*, 13 December 1996.

5. Source for fig. 3: Coats Viyella; reproduced in the *Financial Times*, 16 April 1996.

6. Decentralization involves setting up plants in countries which offer lower labour costs per unit of output.

7. Blanchard and Summers (1986, p.17, fn 1) use the term hysteresis to refer to a situation where the degree of dependence on the past is very high, and the sum of coefficients is close but not necessarily equal to one.

8. In theory, hysteresis is a situation where more than one equilibrium exists, whereas persistence refers to sluggish adjustment to a unique equilibrium. However, Røed (1997, p.406) remarks that 'sensible policy responses towards true hysteresis are not likely to be very different from sensible policy responses towards strong persistence.' See also Benassi et al. (1994, pp.413-414).

9. Key studies include: Blanchard and Summers (1986); Carruth and Oswald (1987); Alogoskoufis and Manning (1988); Graafland (1989); Nickell and Wadhwani (1990); Blanchflower et al. (1990); Holmlund and Zetterberg (1991); Nickell and Kong (1992); Doiron (1995); Lever (1995); Moghadam and Van Rijckeghem (1995); Graafland and Lever (1996); Mulvey (1991, 1997).

10. For a thorough review of the empirical literature on this topic, see Lever (1995, pp.264-272). See also Graafland and Lever (1996, pp.242-244) and Røed

(1997, pp.411-412).

11. Cf. Lever (1995, p.260), who specifies target employment as a weighted average of previous employment and union membership.

12. Trade union membership as a percentage of wage and salary earners. Source: ILO.

13. '... a union call to down tools is invariably answered by far more than just the union's paid-up members. Nearly 6m working days were lost in French strikes in 1995, against 415,000 in Britain and 247,000 in Germany.' Source: 'The Other Bosses in France', *The Economist*, 13-19 December 1997, p.38.

14. For example, if current employment is, say, 20,000 and $U_{i,t} = 0.08$, the formula yields a figure for $m_{i,t}$ of 9.9835, which is very close to the true value of 9.9804.

15. See, for example, Layard and Nickell (1987, p.142) and Røed (1997, pp.400-401).

16. Recall that, for a given variable Xt, $\Delta \ln Xt = \ln Xt - \ln Xt\text{-}1 \approx (Xt - Xt\text{-}1)/Xt\text{-}1$. As an (approximate) proportionate rate of growth, $\Delta \ln Xt$ is much more likely than ln Xt to be stationary. For a good discussion of this topic, see Thomas (1997, pp.376-381).

17. The DF and ADF tests are well explained in Thomas (1997, chapter 14).

18. Choosing an optimal value for k is not a simple task because the various model-selection criteria tend to suggest different values. Akaike's criterion, for instance, typically suggested a relatively high value for k, whereas Schwarz's criterion indicated a relatively low value! (See Pesaran and Pesaran, 1997, pp.352-355, on this point.) Given this ambiguity, along with the need to ensure that the DF and ADF tests were not distorted by autocorrelation, we also examined the values of c2(4) [auto], the LM test statistic for autocorrelation up to order four.

19. The *t* ratio for $\Delta w_{i,t-1}$ is, of course, biased. However, given that N = 99, this bias should not be substantial.

20. Regression [2] underpredicts the rise in real wages in these three quarters by 1.05, 1.27 and 1.45 percentage points, respectively.

21.The usual *F*-test for stability of coefficients (Chow's first test) could not be used because of the inclusion of the two binary variables.

22. The simple correlation coefficients of $\Delta^2 pt$ with Δw_t and $\Delta w_{i,t-1}$ are -0.35 and 0.39, respectively.

23. By contrast, for the paper industry, Dwi,t has a correlation of -0.163 with ut-4 and -0.123 with lturt-4. Whilst these differences are not large, they do provide some scope for the two variables to act individually.

24. The fall in the value of c2(1) [het] from 3.5 to 1.7 reflects the fact that real wages in the textile industry were much more stable in the 1990s than in the period 1972-89.

25. By the 1970s, the French textile industry was dominated by four giant groups. Government policy supported the concentration of this industry.

26. Note that, in equation (7), $\lambda_i = b1/(b1 - b2)$, where b1 is the coefficient of $\Delta n_{i,t}$ and b2 is the coefficient of $U_{i,t}$. We would expect b1 to be positive and b2 to be negative.

27. For the textile industry, TSS = 0.008645 and RSS = 0.0026230. The corresponding values for the paper industry are 0.0173274 and 0.0029586.

28. See Gilbert (1986) for an interesting discussion of alternative approaches to econometric modelling.

29. See, for example, Hall (1986) and Moghadam and Van Rijckeghem (1995).

30. See Banerjee *et al.* (1986, pp.257-258), who note that all of the conventional econometric problems reappear if stationary variables are included in a cointegrating regression.

References

Alogoskoufis G and Manning A (1988) 'Wage Setting and Unemployment Persistence in Europe, Japan and the USA', *European Economic Review*, vol. 32, 2-3, 698-706.

Amemiya T (1980) 'Selection of Regressors', *International Economic Review*, 21, 2, 331-354.

Banerjee A, Dolado J J, Hendry D F and Smith G W (1986) 'Exploring Equilibrium Relationships in Econometrics Through Static Models: Some Monte Carlo Evidence', *Oxford Bulletin of Economics and Statistics*, 48, 3, 253-277.

Benassi C, Chirco A and Colombo C (1994) *The New Keynesian Economics*, Cambridge: Blackwell.

Blanchard O J and Summers L J (1986) 'Hysteresis and the European Unemployment Problem', in Fischer S (ed.), *NBER Macroeconomics Annual*, 1, 15-77, Cambridge, Mass: MIT Press.

Blanchflower D G, Oswald A J and Garrett M D (1990) 'Insider Power in Wage Determination', *Economica*, 57, 226, 143-170.

Brunel J and Saglio J (1984) 'Employers' Associations in France', in Windmuller J and Gladstone A (eds) *Employers' Associations and Industrial Relations: A Comparative Study*, Oxford: Clarendon Press.

Carruth A A and Oswald A J (1987) 'On Union Preferences and Labour Market Models: Insiders and Outsiders', *Economic Journal*, 97, 386, 431-445.

Charrié J-P (1995) *Les Activités Industrielles en France*, Paris: Mason.

COPACEL (1995) *L'Industrie Française des Papiers, Cartons et Celluloses, Rapport d'Activité*, Paris: COPACEL.

Doiron D J (1995) 'A Test of the Insider-Outsider Hypothesis in Union Preferences', *Economica*, 62, 247, 281-290.

Ferron A (1991) *Industrie Française*, Paris: Messidor.

Gilbert C L (1986) 'Professor Hendry's Econometric Methodology', *Oxford Bulletin of Economics and Statistics*, 48, 3, 283-307.

Graafland J J (1989) 'Can Hysteresis Explain Different Labour Market Operations between Europe and the United States?', *Applied Economics*, 21, 1, 95-111.

Graafland J J and Lever M H C (1996) 'Internal and External Forces in Sectoral Wage Formation: Evidence from the Netherlands', *Oxford Bulletin of Economics and Statistics*, 58, 2, 241-252.

Hall S G (1986) 'An Application of the Granger and Engle Two-Step Estimation Procedure to United Kingdom Aggregate Wage Data', *Oxford Bulletin of Economics and Statistics*, 48, 3, 229-239.

Holcblat N and Husson M (1990) *L'Industrie Française*, Paris: La Découverte.

Holden D and Perman R (1994) 'Unit Roots and Cointegration for the Economist', in Rao B B (ed.) *Cointegration for the Applied Economist*, Basingstoke: Macmillan.

Holmlund B and Zetterberg J (1991) 'Insider Effects in Wage Determination: Evidence from Five Countries', *European Economic Review*, 35, 5, 1009-1034.

INSEE (1989) *Vingt Ans de Comptes Nationaux*, Paris: Institut National de la Statistique et des Etudes Economiques.

INSEE (1998) *Marché du Travail - Series Longues*, Paris: Institut National de la Statistique et des Etudes Economiques.

Layard R and Nickell S (1987) 'The Labour Market', in Dornbusch R and Layard R (eds) *The Performance of the British Economy*, Oxford: Oxford University Press.

Lever M H C (1995) 'Insider-Outsider Effects in Wage Formation: An Empirical Survey', *Bulletin of Economic Research*, 47, 4, 257-274.

Lindbeck A and Snower D J (1986) 'Wage Setting, Unemployment, and Insider-Outsider Relations', *American Economic Review*, 76, 2, Papers and Proceedings, 235-239.

MLI (1995) *European Business Survey*, September, 183-256, London: Market Line International.

Moghadam R and Van Rijckeghem C (1995) 'Unemployment Hysteresis, Wage Determination and Labor Market Flexibility: The Case of Belgium', IMF Staff Papers, vol. 42, 4, 882-893.

Mulvey G C, (1991), 'Wage Setting, Pricing and Employment/Output Determination in the Electrical Engineering and Motor Vehicle Industries in the UK: An Examination of Insider-Outsider Theories', Ph.D. thesis, Birkbeck College, University of London.

Mulvey G C, (1997), 'Can Insider-Outsider Theories Explain the Persistence of Unemployment? An Econometric Study of Two British Industries', *Manchester School of Economic and Social Studies*, 65, 2, 170-191.

Nickell S and Kong P, (1992), 'An Investigation into the Power of Insiders in Wage Determination', *European Economic Review*, 36, 8, 1573-1599.

Nickell S and Wadhwani S (1990) 'Insider Forces and Wage Determination', *Economic Journal*, 100, 2, 496-509.

OECD (1985) *Economic Survey: France*, Paris: OECD.

Pesaran M H and Pesaran B, (1997), *Working with Microfit 4.0: Interactive Econometric Analysis*, Windows version, Oxford: Oxford University Press.

Røed K (1997) 'Hysteresis in Unemploymen', *Journal of Economic Surveys*, 11, 4, 389-418.

Thomas R L (1997) *Modern Econometrics*, Harlow: Addison-Wesley.

Zinsou L (1985) *Le Fer de Lance*, Orban: Laurent Fabius.