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CAPITAL SHORTAGE UNEMPLOYMENT IN GERMANY AND THE UK

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I   Introduction

The purpose of the paper is to examine the proposition that capital formation is an important element in the determination of wages and employment in Germany and the UK. Underlying this is the notion that the ability of economies to adjust to exogenous shocks is limited by the quantity and structure of the capital stock.[3] Capital accumulation plays a central role in the swift adjustment process of any economy in response to shocks. Over the period of interest, West Germany and the UK experienced big shocks which have affected their labour and product markets. While the shocks for West Germany and the UK were rather similar until July 1990, the shock of unification has been dramatic for East and West Germany.

During the 1980s, unemployment rose in Germany and the UK dramatically. Causes for the rapid rise and particularly the persistence of unemployment have been attributed to the inflexibility of labour markets to adapt to supply shocks. Inflexibility of labour markets is associated with little effect of unemployment on real wages and a weak response of employment to changes in output. In order to increase labour market flexibility, the OECD (1994) suggests reform of social security systems and employment security legislation and more flexible labour costs. Other studies have emphasized the institutional framework, particularly the power of unions in the wage bargaining process.

Over the last 15 years or so, the labour market in the UK has changed in that it has become more flexible with relatively weaker unions and a high incentive to work. In contrast to that, Germany is known for its comparatively generous unemployment benefit system, strong unions and highly regulated working conditions. We would expect that differences in the labour markets of both countries also show in wage and unemployment differentials. Unification of Germany has affected the flexibility of the German labour market, although, the effects of unification are wider and more profound. The GEMSU (German Economic, Monetary and Social Union), founded on 1 July 1990, has been a major shock for Germany as a whole.

In order to investigate similarities and differences in wage and unemployment determination in Germany and the UK, we employ a common theoretical framework and a set of comparable data. The theoretical model is comparable to other wage models in that it considers the importance of efficiency wages, insider-outsider theories, wage relativities, and wage bargaining. However, given the institutional differences in the two countries, theoretical and empirical differences are inevitable.

In most other wage models the problem of job creation is mainly regarded as a matter of encouraging more employment with *given* capital stock. We argue that slow capital accumulation during a recession results in a capital stock that is too small to allow a swift return to the previous level of employment (Malinvaud, 1986; Bean, 1989; Sneessens and Dreze, 1986; Rowthorn, 1995). Our main concern in this study is to present a theoretical wage model that incorporates capital stock as a determinant of unemployment and to provide some preliminary empirical results of the importance of capital stock growth for employment in both countries.

There is an argument that suggests that capital stock is an important variable when analyzing unemployment. In Germany and the UK, the effects of the two oil price shocks showed similar movements in the variables of interest, although it appears that Germany's economy generally performed somewhat better than the UK's. During the two oil price shocks, inflation accelerated and in order to bring inflation under control, restrictive demand policies were introduced. As a result, capacity utilization fell, unemployment rose and firms scrapped spare capacity.[4] During the first oil price shock, unemployment rose in the UK (Germany) from 2.1% (1.1%) to 3.8% (3.7%), capacity utilization fell from 89% (97.8%) to 84% (95.4) and capital formation fell from 3.5% (5.1%) to -0.3% (3.3%) p.a.[5] All percentages are averages with the reference periods 1967 to 1973 (pre-shock period) and 1974 to 1978 (first-shock period). During the second oil price shock, the effects were even more dramatic. From 1979 to 1981,

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[4] A similar line of argument was put forward in Rowthorn (1995) and Carlin and Soskice (1991).

[5] Capacity utilization refers in the UK to the manufacturing sector and in Germany we only have data here from 1970 onwards. German capital stock data is here only until 1993.

unemployment averaged in the UK 6.3% while in Germany remained relatively constant at 3.9%. In the UK, average capacity utilization was 81.5% and capital stock was ultimately scrapped at an average rate of 0.5%. This compares with a slight increase in average capacity utilization to 96.8% and a constant growth of capital at 3.4% in Germany. After the shocks were reversed, inflationary pressure was reduced but employment did not return to previous levels, since the loss in capital was not made up. From 1982 until 1994, unemployment averaged 10.5% in the UK, while capacity utilization and capital formation returned to normal rates, 88.2% and 3.3%, respectively. Similarly, in Germany, where unemployment levels also rose dramatically to an average of 7.6%, capacity utilization and capital growth remained constant. Although capital stock growth rates in the UK have recovered since 1982 to the previous level, capital formation since 1974 is on average 1.9%, indicating a substantial fall from the pre-shock growth path. Germany's capital formation rate averaged 3.4% since 1974 which compares with 5.1% in the pre-shock period. Through unification, Germany increased its potential in labour. However, because of the deficient and obsolete capital stock inherited from East Germany, the existing capital stock is too low to engage the unemployed in the productive process.

The facts that in both countries capacity utilization returned to previous levels, and that capital stock grew slowly for 20 years or so, indicate that the transition path is very slow. Unemployment develops very quickly in response to adverse shocks and it takes a long time to reverse. This is also the result in studies on asymmetries in the cyclical behaviour of the UK labour market.

In the following section we present the main ideas of the wage model, which incorporates the capital shortage hypothesis (see also Arestis and Biefang-Frisancho Mariscal, 1997a, 1998). Section 3 is concerned with the empirical evaluation.

2 Theoretical Model

The fundamental idea underpinning our model was suggested by efficiency wage models (Shapiro and Stiglitz, 1984), namely that conflict in the work place arises over labour productivity (e) and the real wage (W/P),

$$W / P = f(e) \quad (1)$$
$$\underset{+}{}$$

where the sign under a variable gives the direction of the partial derivative. Labour productivity depends on the cost of job loss (c) and socio-economic factors z_i, so that:

$$e = e'(c, z_i) \quad (2)'$$

with the cost of job loss conventionally determined by the real wage (W/P), the expected real wage (W^e/P^e), the chance of unemployment (U), and the expected income from unemployment (W^e_u/P^e), which allows us to re-write (2)' as:

$$e = e[(W / P), z] \quad (2)$$
$$\underset{+}{}$$

where z includes z_i and the remaining elements in c.

Efficiency wage theories are concerned with the relationship between work effort and the real wage. In fact, wages are negotiated and the nominal wage is determined on the basis of workers' expected real wage (W^e/P^e). Combining equations (1) and (2), we may establish a direct relationship between the negotiated nominal wage (W_{t+1}), the expected real wage and the socio-economic factors (z) as:

$$W_{t+1} = P^e k'[(W^e / P^e), z] \quad (3)$$
$$\underset{+}{}$$

The socio-economic elements refer to the conflict over income distribution and worker militancy (Rowthorn, 1977; 1995), pay norms and fairness of pay between groups of workers (Keynes, 1936; Hicks, 1975), and the level and composition of unemployment (Blanchard and Summers, 1987; Lindbeck and Snower, 1986; Nickell, 1987). Conflict in the labour market is measured by the aspiration gap ($\Pi^*-\Pi^n$) which shows the extent to which the target profit share (Π^*) differs from the negotiated profit share (Π^n). The latter depends on the claims of the foreign (F) and government (G) sectors and demand conditions in the labour market proxied by unemployment (U). The target profit share is determined by the claims of the government and foreign sectors and demand conditions in the product market (Φ). A positive aspiration gap implies that workers' actual wage is below the one they anticipated in wage negotiations. In response they may threaten to withdraw or reduce work effort as a means to enforce wage claims. Workers are the more successful in demanding higher wages, the lower the rate of unemployment is and the more militant (X) they are.

Capacity utilization (Φ) may be explained by the existing capital stock and the level of economic activity. This introduces the capital shortage hypothesis, whose fundamental idea is

that big adverse shocks, as for example the two oil price shocks, or, unification, may persistently increase unemployment due to insufficient productive capital. The oil price shocks increased the claims of the foreign sector on national income and accelerated inflation. In order to bring inflation under control, restrictive demand policies were introduced. As a result, capacity utilization fell and firms scrapped spare capital. After the shocks were reversed, inflationary pressures were reduced and employment rose. However, employment did not return to previous levels due to a lack of productive capital. As a consequence, the economy is locked into a situation of high unemployment combined with normal capacity utilization.

Fairness of pay between groups of workers relates to the wage structure, where workers resist money wage cuts for fear of a decline in their relative position in the wage hierarchy. A wage system with well established wage differentials is regarded as fair and it becomes what is expected to be. The real expected wage (W^e/P^e) is thought to capture this historical element that affects the effort function and the negotiated wage.

Membership theories are concerned with the composition of unemployment and the effect different groups in the pool of the unemployed have on wage determination. A high level of unemployment itself may not exert sufficient downward pressure on wage demands, however, the rising inflow into unemployment (ΔU) threatens insiders' jobs and they may give in on wage objectives.

We may now summarize the socio-economic elements and thus write the z-vector as:

$$z = z(\Pi^* - \Pi^n, F, T, g(X), W^e / P^e, W_u^e / P^e, h(U)) \quad (4)$$

where $g(X)$ describes worker aggressiveness and $h(U)$ comprises unemployment and hysteresis effects.

Substituting (4) into (3), we may arrive at:

$$W_{t \cdot 1} = P^e k / (\Pi^* - \Pi^n), F, T, g(X), (W^e / P^e), (W_u^e / P^e), h(U)] \quad (5)$$
$$\quad + \quad + + \quad + \quad\quad + \quad\quad\quad - $$

Writing the model in log-linear form, equation (6) follows:

$$w_{t \cdot 1} = p^e + \alpha_1 (w_u^e - p^e) + \alpha_2 (w^e - p^e)$$

$$+ \alpha_3 [p^e - w^e + lp^e + k] - \alpha_4 [p - w + lp]$$

$$+ \alpha_5 x + \alpha_8 ti + \alpha_9 ti^e + h(u) \quad (6)$$

where lower case letters denote logarithms and where all coefficients are greater than zero. The vector ti stands for the claims of the foreign and government sectors on private output and contains real import costs and tax variables. The expressions in square brackets describe the aspiration gap as discussed above, without the tax and import cost variables since they are already included in the ti variable. The first square bracket describes the target profit share as a mark-up over real wage costs in relation to the demand conditions in the product market, proxied by capacity utilization.

Assuming that expectations are formed as (Layard et al., 1991),

$$\Delta s_{t \cdot 1}^e = s_t + \Delta s_t \quad (7)$$

and performing some simple algebraic transformations, we arrive at equation (8),

$$\Delta\Delta w = \alpha_1 lp + \alpha_2 \Delta lp - \alpha_3 (w - p) - \alpha_4 \Delta(w - p) + \alpha_5 (w_u - p)$$

$$+ \alpha_6 \Delta(w_u - p) + \alpha_7 x + \alpha_8 ti + \alpha_9 \Delta ti$$

$$+ \alpha_{10} k + h(u) \quad (8)$$

The relationship in equation (8) can be interpreted as follows: nominal wage acceleration depends on real wages, productivity, unemployment, real benefits, tax and import costs, capital stock, the expected changes in these variables and a variable capturing militancy. The idea to include capital stock in (8) is novel: an increase in the capital stock allows real wages to rise, as capacity utilization falls and firms' ability to mark-up is limited (Rowthorn, 1995).

The long-run real wage equation can be obtained by letting $\Delta(w-p)$, $\Delta(w_u-p)$, Δlp, Δti, Δu and Δk equal to zero to give:

$$(w - p) = \beta_1 (w_u - p) + \beta_2 x - \beta_3 u + \beta_4 ti + \beta_5 k + \beta_6 lp \quad (9)$$

where l_u denotes the ratio of the long-term unemployed in the pool of the unemployed. As suggested by membership theories, the long-term unemployed are not able to price themselves into the labour market because of a decline in human capital, low motivation for active job search, and stigmatizing perception of the potential employer.

When the target and the negotiated profit shares are equal, the NAIRU (non-accelerating rate of inflation) can be derived as:

$$u = \gamma_1(w_u - p) + \gamma_2 x + \gamma_3 ti - \gamma_4 k + \gamma_5 lp \qquad (10)$$

It is an increasing function of real benefits, tax- and import costs, and worker militancy, and declines with an increase in the capital stock. A fall in capital stock increases capacity utilization, allowing firms to raise prices. As a consequence, conflict in the labour market augments and inflation increases. A stabilization of the inflation rate then requires a rise in the NAIRU. A positive relationship between real wages and unemployment benefit implies that a fall in the latter results in a decline in unemployment, due to its labour-cost-reducing impact. An increase in taxes or import costs will, under given demand conditions, increase conflict over income shares and will raise inflationary pressure. The more wage earners resist a fall in their income share, the lower are the tax- and import- effects on the long-run unemployment rate. Worker militancy affects the bargained real wage and *ceteris paribus* income distribution, where the latter determines the level of employment through its supply and demand side effects.

3 Empirical Investigation

On the basis of the wage model presented in the previous section, we estimate a model of employment growth (Δemp) which is explained by the growth of capital stock, the growth of real import costs (Δpi) and taxes (Δta), the growth of labour productivity and a proxy for militancy.

The estimations allow us to compare employment determination in both countries and, particularly to test for the effect of capital growth on employment. For both countries, we use quarterly and seasonally adjusted data, covering the period from 1966Q1 to 1994Q4. All variables included in the estimations are stationary.[6] The estimation procedure is the 'general to specific' (Hendry et al., 1984), where the 'general' model includes all the relevant variables,

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[6] The results of the unit root test can be received from the authors on request.

lagged up to five periods. Restrictions are imposed on the 'general' model and tested for their validity in order to derive at a parsimonious specification.[7] Since we use quarterly data, the dynamics are quite complex for both countries. *Table 1* shows the parsimonious ordinary least squares estimations. The estimated models for the UK and Germany are satisfactory with respect to their theoretical priors and their statistical performance.

In both countries, employment is explained by previous levels of employment, capital stock and taxes and import costs. In the case of the UK, the ratio of employees on strike to all employees, which proxies worker militancy, is significant.[8] We tried for Germany a strike dummy for 1984, which however always proved to be insignificant. The variable 'wedge' describes the gap between the consumer and the product wage, which is calculated as the sum of employers', employees' and indirect taxes and real import costs, weighted with the import share.[9] In the case of Germany, a split between import cost and tax effects gave better results. The latter was calculated as the ratio of gross wages and salaries to net wages and salaries.[10]

The results of *Table 1* are quite suggestive which the following indicative calculations concerning capital stock and employment growth may illustrate. Turning first to the equation for Germany, capital stock growth has a significant positive effect on employment growth with an elasticity of 0.115. Suppose that capital had grown since 1973 by 1% faster than it actually did. Even then, this would still have implied a major slowdown in capital growth in comparison to the pre-1973 period.[11] However, the cumulative effects would have been quite large. By 1994, there would have been extra capital stock of about 24.5%. Using the calculated elasticity, this would have meant an extra 2.8% in employment, which implies that by 1994 there would have been an extra employment of about 0.840m.[12] Although unemployment would still have been high, it would have been 1.8 percentage points below the actual figure of 9.6% in 1994. These calculations are indicative, however, they show that in response to small changes the cumulative effects may be considerable.

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[7] We used the programme package Microfit4.0.

[8] The data are taken from various issues of the Employment Gazette.

[9] Data for both countries were kindly provided from the National Institute for Economic and Social Research, unless otherwise stated.

[10] The data were gratefully received from the Deutsches Institut für Wirtschaftsforschung.

[11] Between 1967 and 1973, capital stock grew in Germany on average at an annual rate of 5.1% and has fallen to an average of about 3.4% between 1974 and 1994.

[12] This and the calculation for the UK are based on the average labour force over the period 1973 and 1994.

Table 1

Variable	Δemp_G	Δemp_{UK}
constant	- 0.001	- 0.0001
	(3.7)	(1.3)
Δemp_{t-1}	0.710	1.038
	(11.2)	(11.5)
Δemp_{t-2}		- 0.224
		(2.5)
Δk_{t-1}		0.008
		(2.1)
Δk_{t-3}		0.011
		(2.7)
Δk_{t-5}	0.115	0.009
	(6.0)	(2.0)
Δpi_{t-4}	- 0.009	
	(2.1)	
$\Delta wedge_{t-1}$		- 0.010
		(3.0)
$\Delta_4 ta_{t-2}$	- 0.022	
	(2.6)	
Δlp_{t-1}	0.014	
	(1.9)	
Δlp_{t-2}		0.033
		(2.8)
x_{t-3}		- 0.016
		(2.8)
D1	- 0.019	
	(10.9)	
R^2	0.71	0.88
AR	0.7	0.5
RESET	2.3	0.6
NOR	0.7	0.8
HET	0.4	1.4

Note:The values in brackets under the coefficients denote the t-statistic. R^2 is the adjusted coefficient of determination and the meaning of the diagnostic tests is as follows: AR is the Lagrange multiplier test of serial correlation up to fourth order, RESET is Ramsey's RESET test for functional form misspecification, NOR is the Jarque-Bera test for normality in the residuals, and HET is a test for heteroscedasticity based on the squared residuals on fitted values.[13] All diagnostics are reported in their F-version, except for the normality test, which is in its Chi-square version. None of the diagnostics is significant at its 5% level.

Other variables of importance in the German employment equation are real import prices and taxation. The effect of foreign competition, although significant, appears to be minor in the German case. Furthermore, a one percent increase in wage taxation reduces employment growth by a mere 0.02 per cent. Although the elasticity is rather modest, tax effects in Germany are more than twice the value in the UK, which may indicate the difference in wage costs in both countries. The elasticity of labour productivity is with 0.014 less than half of that in the UK. Furthermore, it is just significant at the 6% level. On the other hand, the higher coefficient for labour productivity in the UK may signify that gains in labour productivity allow the UK economy to operate with less unemployment. Since growth studies show that increases in investment are associated with rises in labour productivity, this may provide the avenue through which a rise in capital stock reduces unemployment in the UK. The direct effect of capital stock growth on employment is in the UK much smaller than that in Germany. Calculations similar to those for Germany suggest that a 1% rise in capital since 1973 could have increased employment by only about 0.22%, which means that the reduction in unemployment would have been about 61,000.

The estimations for both countries seem to indicate that in Germany the direct effect of capital growth on employment is substantial. In the UK case, labour productivity seems to be the

[13] For further details see Pesaran, M.H. and Pesaran, B. (1991), Microfit3.0, Oxford University Press.

driving force in employment growth. However, there may also be an indirect effect of investment on employment through its positive effect on labour productivity.

4 Summary and Conclusion

We presented a wage model for the UK and Germany, that combines efficiency wage theories, ideas on wage fairness, wage bargaining and membership theories into a coherent model. Contrary to most standard wage models that regard job creation as a matter of encouraging more employment on the existing capital stock, we suggest that slow capital accumulation in a recession may result in a capital stock that does not allow for a swift return to previous levels of employment once demand recovers. The empirical findings suggest that there are cumulative effects which indicate that a small increase in capital accumulation may increase employment substantially.

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