ISSN: 0926-6437

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JOURNAL OF INCOME DISTRIBUTION

An International Quarterly of Social Economics

Volume 11, Number 1-2
Spring–Summer 2002

Glendon College
YORK
UNIVERSITY

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PUBLISHED BY
TRANSACTION PERIODICALS CONSORTIUM
RUTGERS–THE STATE UNIVERSITY OF NEW JERSEY

UNEMPLOYMENT AND PROFITABILITY IN SPAIN

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This paper explores empirically the relationship between the high and persistent unemployment in Spain and the profitability on invested capital. It is shown that there exists a negative long-run relationship between the two variables, an unemployment-profit rate trade-off (UPRT). A conditional equation with constant parameters relating the unemployment rate to the profit and capacity utilization rates is derived. Exogeneity tests indicate that profit rate and capacity of utilization are *weak*, *strong*, and *super exogenous* for the parameters of the unemployment equation. .

"If one could only imagine such a situation in the U.S. or the U.K. or any other industrialized country, it would be easy to see why the very extraordinary nature of the phenomenon under scrutiny demands the use of equally extraordinary tools of analysis. My view is clear: show me an industrialized country carrying the burden of 25% of unemployment, and I will show you a full-blown depression that cannot be explained away by neoclassical parables." (Roman 1997, p. 6)

Keywords: Cointegration, Exogeneity Analysis, Profit Rate, Spain, Unemployment

1. Introduction

Unemployment is Spain's foremost economic and social problem. In 1998 there was a reserve army of over 3 million unemployed workers, equivalent to 18.81% of the active population. This is close to twice the European rate, and almost four times the U.S. rate. However, up to the late 1970s Spain's unemployment rate was not significantly different from that in other European countries and the U.S. But beginning in the early 1980s the rate began soaring at a pace much faster than that in other countries, with the result that the average unemployment rate for 1988–1992 was more than six times that of 1974–1979 (Bean 1994, Table 1). And by 1994 it had reached a record 24.16% (3.7 million workers). These figures place Spain well on top in the unemployment ranking among the

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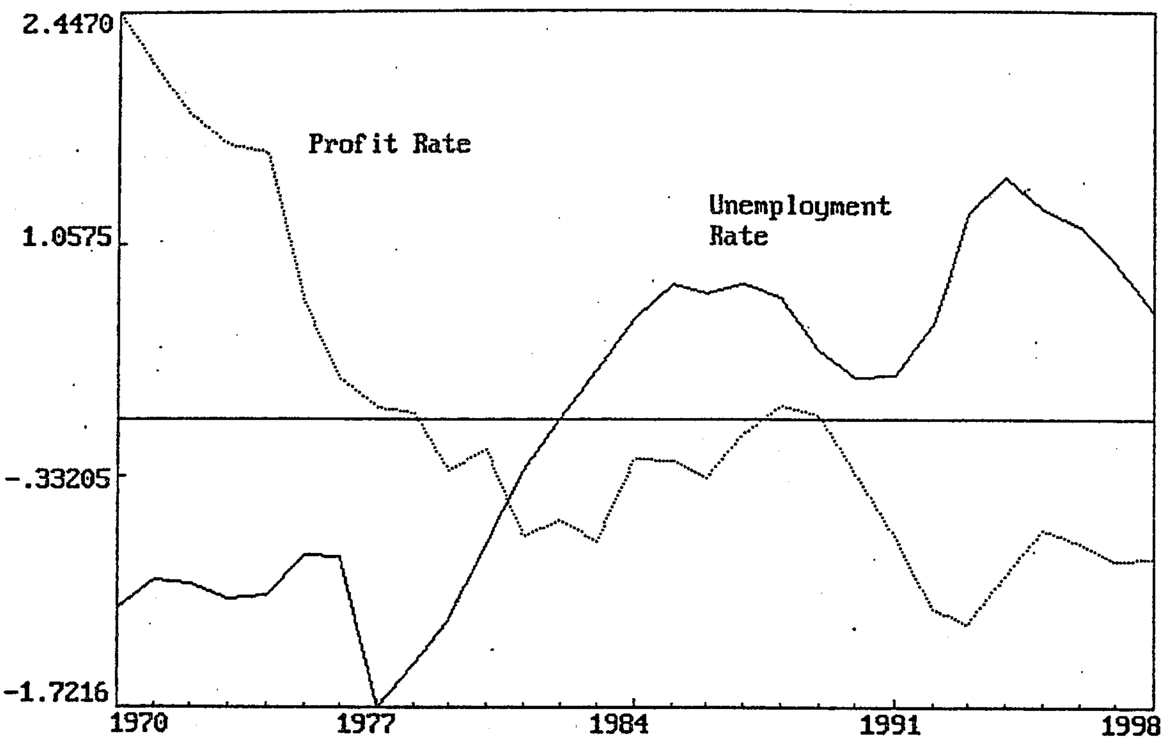
Figure 1

Normalized Unemployment and Profit Rates



OECD economies. Figure 1 shows the evolution of the unemployment rate between 1970 and 1998.[1]

This paper explores empirically why unemployment in Spain is so high and persistent. Drawing on arguments from the classical literature, a key variable is introduced in the analysis of unemployment, namely, the profitability on the invested capital. It seems paradoxical that while this variable is often quoted by businessmen, management specialists, or laymen, it has traditionally been neglected by neoclassical economists (Malinvaud 1982, p.11; Glyn 1997).[2] In a market economy firms struggle to (at least) maintain their profit rates and competitiveness. To do so they must invest in capital so as to increase labor productivity. The introduction of technical change in the context of capital accumulation raises the capital-output ratio and induces a tendency for the rate of profit to fall. Firms will react by (among other things) reducing employment. In their attempt to re-establish their profit rates, firms will try to increase labor productivity by further increasing the capital-labor ratio, thus engaging in a spiral of ever-increasing capital intensity, laying off workers, and decreasing profit rates. This process gives rise to a long-run relationship between unemployment and profitability, an unemployment-profit rate trade-off (UPRT).

There are plenty of theories and explanations of unemployment, and specifically European unemployment. Bean (1994) and Dent (1997, Table 10.6) are two recent surveys of the literature. Dent notices that "there is a general lack of consensus between theorists over the issue with certain determining factors prioritised over, or contradicting those emphasised by others" (Dent

1997, p.359). Nevertheless, from the mid-1980s some theorists have appealed to different forms of hysteresis in order to explain the persistent high rates of unemployment in Europe. Models with a neoclassical twist tend to blame rigidities in the labor market (e.g., behavior of trade unions, and the wage-benefit link), or shifts in the skill composition of labor demand. Their policy recommendations focus primarily on measures to increase labor demand flexibility or improve the skills of the labor force.[3]

In a series of recent papers Blanchard (1998, 1999) and Blanchard and Wolfers (2000) argue that in order to understand the evolution of European unemployment one needs to take into account jointly the shocks which have affected Europe over the last thirty years, and labor market institutions (e.g., strong unions, high payroll taxes, minimum wages, generous unemployment insurance, high employment protection). Regarding the shocks, they argue that, up to the mid 1980s, unemployment was mostly the result of the failure of wages to adjust to the slowdown in total factor productivity (TFP) growth. From the mid 1980s onward, on the other hand, the increase in unemployment has been the result of a decrease in labor hoarding, which has led to an increase in firms' profits. This, they argue, will lead over time to capital accumulation and higher employment. On the institutional side, they argue that theory gives an ambiguous assessment of the effects of labor market rigidities on unemployment.[4] Probably, institutions have been such that shocks have had a large and prolonged effect on unemployment; but they are not its original cause.[5] When Blanchard (1999) put his model to work pooling data for twenty-one OECD countries, it did, overall, a good job. However, the model predicted Spain's unemployment rate very poorly (large underprediction).

Real wages in Spain grew above productivity during 1970–1976 (this marks the end of the previous political regime. Felipe (2002) provides a summary of the historical background of the labor relations developed in Spain during the dictatorship, and how they are part of today's unemployment problem), but shortly afterwards wages were back in line with productivity. And institutions, as argued by Blanchard, cannot be considered the main cause of unemployment. Thus, the most likely explanation about unemployment in Spain is a decrease in labor hoarding for profit reasons. Where the agreement between Blanchard's argument and the one put forward in this paper ends is in the chain of events. Higher profits *can* lead to capital accumulation but not necessarily to higher employment. As argued above, firms try to increase labor productivity by increasing the capital-labor ratio. This increase in capital leads to a decrease in profit rates.

In an interesting departure from the standard neoclassical emphasis on labor market rigidities as the cause behind unemployment, Rowthorn (1995, 1999) shows that investment can play an important role in the fight against unemployment, and thus shifts the focus to macroeconomic policy and away from labor market rigidities.[6] He argues that low investment has been a significant factor behind the rise in unemployment in Western Europe.

The rest of the paper is structured as follows. Section 2 provides a rationale for the relationship between unemployment and profitability. Section 3 proposes a simple model of the unemployment rate. The econometric approach followed is that of Hendry and his associates, which is probably best summarized in Granger (1990), Journal of Policy Modeling (1992), Banerjee et al. (1993), Ericsson and Iron (1994) and Hendry (1995). Section 4 shows the results of tests for the order of integration of the series, and performs systems cointegration analysis. Section 5 derives a conditional equation with constant parameters relating the unemployment rate to the profit rate and capacity utilization. Section 6 carries out tests for weak, strong, and super exogeneity. Each of these concepts is relevant if one wants to use an empirical econometric model for hypothesis testing, forecasting, or policy analysis, respectively. Section 7 concludes.

2. The Relationship between Profitability and Unemployment

Profit is the veritable bottom line of the market system. As firms invest, they add to their aggregate capital stock. With a constant rate of profit the total amount of profit grows correspondingly. But if profits grow more slowly than the capital stock, then the profit rate falls. And a secular decline in the profit rate progressively undermines the incentive to invest and thus slows down the rate of growth of the capital stock itself. These two effects serve to undermine the growth of total profits. Therefore, an initially growing mass of total profits begins to decelerate until at some point it stagnates or even declines. And when total profits are stagnant, firms find themselves in a situation where they invested in additional capital without getting any additional profit. This implies that a proportion of their capital stock is idle. If this situation persists, then investment is cut back, excess capacity becomes widespread, and workers are laid off.[7] In the words of Joan Robinson:

> "When there is a strong capital-using bias in technical progress, it requires a higher flow of gross investment to maintain a constant long-run level of employment. If sufficient gross investment is not forthcoming, a reserve army of long-period unemployed is created again." (Robinson 1977, p.1333)

And more recently, Zarnowitz has described a similar chain of events:

> "If an economic slowdown reduces profit margins and dims the outlook for profits, the likely reaction of business firms will consist first in cutbacks on decisions to invest, then if matters do not improve, in reductions of inventories, output and employment." (Zarnowitz 1999, p.74)

As indicated in the introduction, Blanchard (1999) has argued that the increase in Europe's unemployment rate since the 1980s is, among other reasons, the product of a steady reduction in labor hoarding. This has led to an increase in firms' profits and in the capital share. He argues that higher profits will lead in the near future to capital accumulation and higher employment. This is not so simple. The reason is that the accumulation process entails a decrease in the profit rate, and this places limits on the creation of employment. Figure 1 above also shows the evolution of the profit rate in Spain for the period 1970–1998. It displays a clear downward trend.[8]

Why do profit rates *tend* to fall? From an algebraic point of view, the average gross profit rate is the ratio of overall profits (operating surplus) to the stock of capital:

$$r_t = \frac{\Pi_t}{K_t} = \frac{(Q_t - w_t L_t)}{K_t} \tag{1}$$

where r denotes the average profit rate, Π denotes overall profits, Q is value added, w is the average wage rate, L is employment (the product wL is the total wage bill), and K is the value of the stock of capital.[9] Equivalently, the profit rate can be written as the ratio of 1 minus the labor share to the capital-output ratio, that is,

$$r_t = \frac{1-a_t}{K_t / Q_t} = \frac{1-a_t}{(K_t / L_t)(L_t / Q_t)} \tag{2}$$

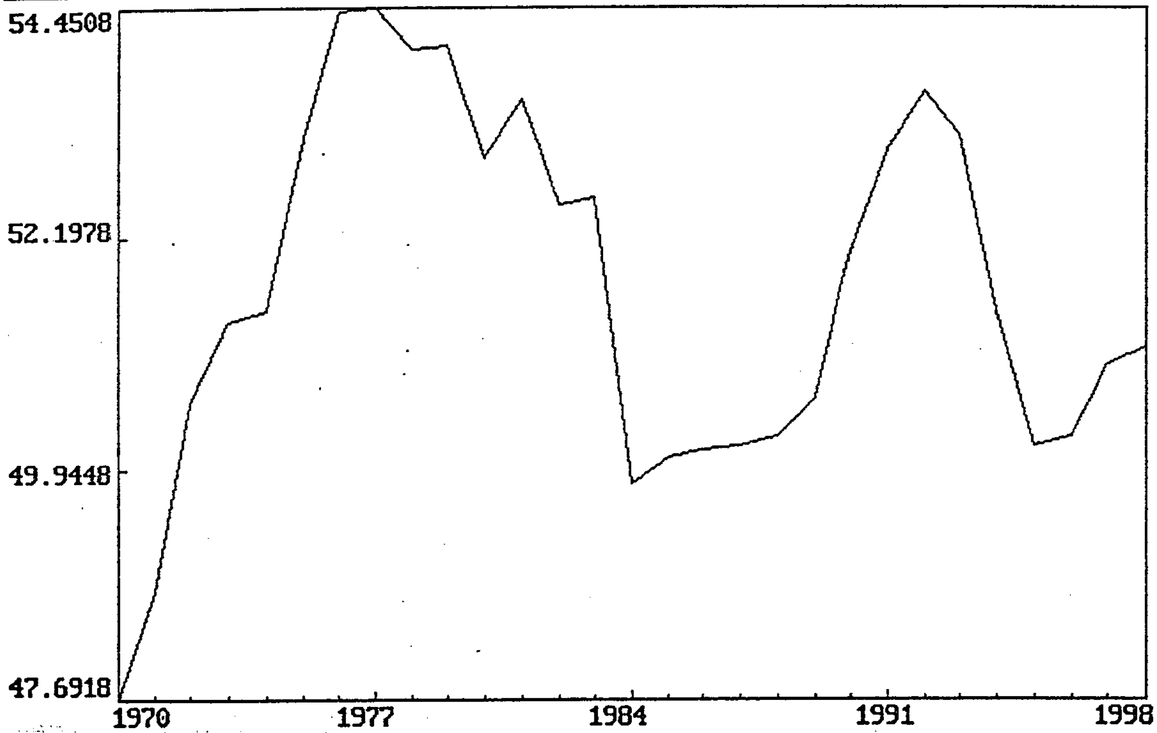
where $a_t = w_t L_t/Q_t$ is the labor share, and $1\text{-}a_t$ is capital's share. This implies that the profit rate will fall either because the labor share increases, or because the capital-output ratio increases. Given that the former tends to be relatively constant (this is true for Spain too. See Figure 2), the most likely reason behind the decline in the profit rate is the increase in the capital-output ratio.[10] Moreover, the latter can be written as the product of the capital-labor ratio times the labor-output ratio (i.e., inverse of labor productivity). Since labor productivity is increasing (i.e., the labor requirement per unit of output is decreasing), the reason why the capital-output ratio increases is that the capital-labor ratio increases faster than labor productivity. Indeed, for 1970–1998 labor productivity grew at an annual rate of 2.15% (3.07%, 1.81%, 1.17% during 1970–1980, 1981–1990, 1991–1998, respectively), while the capital-labor ratio grew at an annual rate of 3.08% (4.49%, 1.53%, 1.79%, during 1970–1980, 1981–1990, 1991–1998, respectively).[11]

What is the rationale behind the arguments above that support the idea of a long-run UPRT schedule?[12] The essence of a market economy is competition for markets. In the final analysis the crucial variable which determines a firm's survival is the cost of the product. The lower the price for a product of a given quality the better the chances of success. This is why firms are continually worried about the idea of lowering costs, for this is the way to increase their profit rate (Shaikh 1993). The reduction in unit costs is achieved mainly through increases in labor productivity. The drive to raise productivity leads to an ever-increasing mechanization of the production process. However, as more fixed capital per worker is required, machines replace workers (i.e., new equipment is labor saving whereas there is an excess supply of labor). But if mechanization (i.e., increase in capital intensity) is to be successful in the competition struggle, it must reduce unit costs. Larger-scale plants and equipment require greater amounts of fixed capital per unit of product. This way, higher fixed costs are traded off in return for lower variable costs.

Once a new, lower cost method becomes feasible, the investment picture changes. The first few firms to adopt the new method are in a position to lower their selling prices, undersell their competitors, and expand their own shares of the market. All firms now face a round of falling prices, i.e., "first-mover" advantages (Marx 1972; Chandler 1990). Under these new circumstances, the firms with the lowest unit costs will be the ones with the greatest chance of survival. The reason is that price reductions damage the anticipated profit rates

Figure 2

Labor Share in Value Added (%)



of the higher cost methods more than those of the lower cost processes.[13] In the words of Pulido (1995, p.347) Spain's unemployment problem is basically "one of lack of capacity of the system to maintain the necessary level of activity to provide work to those who wish to work."

It is important to emphasize that this process *need not* be generated by rising real wages. It is true, however, that demand for higher wages may accelerate the fall in the rate of profit, as is obvious from the definition of the profit rate above. But this effect is limited because rising real wages are generally constrained by the growth of productivity. No firm can sustain rising unit labor costs for any length of time without risking extinction. In this sense, this analysis does take into account wages. The argument is that wages are part of a firm's profitability *requirement*. Obtaining a rate of return on the capital employed is fundamental to a firm's survival and it is part of its pricing strategy. Scherer, in an analysis of General Motors, described the process as follows:[14]

> "GM begins its pricing analysis with an objective of earnings, on the average over the years, a return of approximately 15 per cent after taxes on total invested capital. Since it does not know how many autos will be sold in a forthcoming year, and hence what the average cost per unit (including prorated overhead) will be, it calculates costs on the assumption of standard volume—that is, operation at 80 per cent of conservatively rated capacity. A standard price is next calculated by adding to average cost per unit a standard volume of sufficient profit margin to yield the desired 15 per cent after-tax return on capital." (Scherer 1970, p.174).

3. A Model of Unemployment

Given the previous considerations, this paper proposes a simple empirical model that departs from the standard neoclassical framework and specifications. Following the post-keynesian literature, it is argued that there is not a labor market in the real world in the way envisaged by neoclassical economics. Likewise, there is no functional relationship between demand for labor and wages (Arestis 1992, p.94). Davidson (1983) showed that there is no aggregate demand for labor schedule with the real wage as the independent variable. Furthermore, applying the neoclassical framework at the macro level poses serious theoretical problems. On the one hand, the Cambridge critiques invalidate the standard aggregate labor demand curve, for it assumes the traditional notion of "capital" as a single factor (Petri 1999, pp.51–52). On the other hand, Fisher (1993) showed that aggregate production functions can be derived theoretically only under very stringent conditions. The aggregates of output, labor and capital, as if they were derived from a well-behaved production function, do not exist for all practical purposes. This implies that the optimization condition according to which the wage rate equals the marginal product of labor at the macroeconomic level has a dubious interpretation, if any at all.[15]

The neoclassical concept of the supply curve of labor is also dropped. In the words of Joan Robinson:

> Again, the orthodox conception of wages tending to equal the *marginal disutility* of labour, which has its origin in the picture of a peasant farmer leaning on his hoe in the evening and deciding whether the extra product of another hour's work will repay the extra backache, is projected into the modern labour market, where the individual worker has no opportunity to decide anything except whether it is better to work or to starve (Joan Robinson 1942, pp.2–3; italics original).

And as Klein put it: "The workers have nothing to say about the amount of employment that will be forthcoming at any point in time" (Klein 1947, p.116). More recently, Davidson (1983) has argued against the modern neoclassical derivation of the supply curve of labor where optimizing individuals engage in inter-temporal substitution. And Nell argues that "no labor market jointly determines real wages and employment" (Nell 1988, p.264) The supply of labor (L^S) is, therefore, an exogenous variable represented here by the labor force and determined by demographic factors. In terms of changes,

$$\Delta L^s = L^s_t - L^s_{t-1} = f(\Delta P) \tag{3}$$

where P denotes population, and theoretically $f_{\Delta P} > 0$.

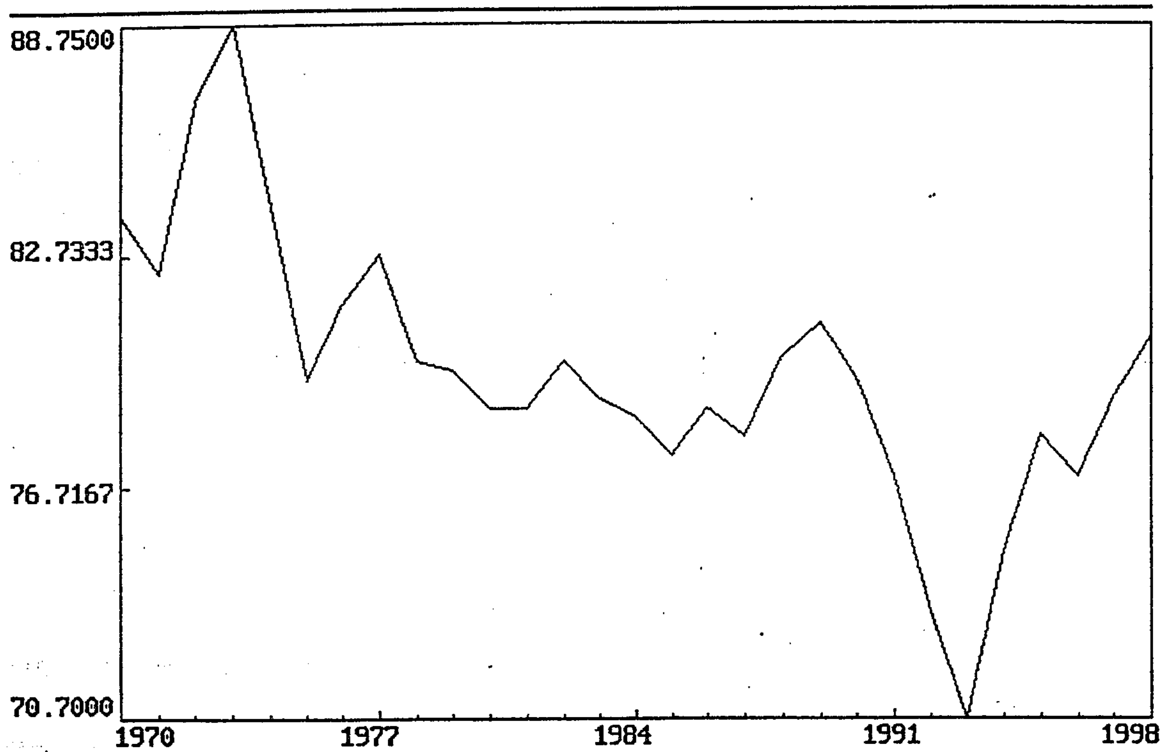
In the proposed model the demand for labor (L^d) is a positive function of the stock of capital (K), i.e., $L^d = L^d(K)$ with $L^d_K > 0$.[16] Thus, the change in labor demand depends on investment ($\Delta K = I$), i.e.,

$$\Delta L^d = L^d_t - L^d_{t-1} = f(I) \tag{4}$$

reflecting the view that investment in new productive capacity will create jobs. Investment, following Kalecki (1954), Steindl (1952), Robinson (1962), Marglin

Figure 3

Capacity Utilization Rate (%)



(1984), Bhaduri and Marglin (1990), and Blecker (1989) is a function of the changes in the expected profit rate (Δr^e) and the changes in capacity utilization (Δuticap), which serves as a proxy for cyclical demand, i.e.,[17]

$$\Delta K = I = I(\Delta r^e, \Delta \text{uticap}) \tag{5}$$

where "r^e" denotes the expected profit rate, and "uticap" denotes the rate of capacity utilization. The expected signs are $I_{\Delta r^e} > 0$ and $I_{\Delta \text{uticap}} > 0$.[18] Desired accumulation depends on the expected profitability because profits are both the returns to investment, and the primary source of finance for investment. Capacity utilization influences the decision to invest in the sense that high utilization induces firms to expand capacity more rapidly in order to keep up with anticipated demand; while low utilization (i.e., excess capacity) induces them to cut back on planned investment. In other words, when a portion of the country's factories and equipment are idle, their owners have little incentive to invest in new productive equipment, and thereby expand the underutilized capacity. A high rate of capacity utilization will transform a high profit share into a high profit rate, and will stimulate further investment.[19] Figure 3 shows the rate of capacity utilization in Spain. It has been declining systematically during the thirty-year period considered. It has recovered after bottoming in 1993, when it reached a low 70%.[20]

Furthermore, one of the main determinants of the output-capital ratio is the level of capacity utilization in the economy. The higher the latter, the higher will be the ratio of output to capital and, for a given capital share, the higher will be the profit rate (Equation (2)).[21]

The relationships described in the previous paragraphs, especially the investment function, have the advantage of separating demand and supply sides impacts on investment. The former via utilization capacity; and the latter via the profit rate, which shows the cost-reducing effect of a lower wage rate. As pointed out above, wages appear indirectly in this formulation through the profit rate.[22]

The change in unemployment (the difference between the changes in the supply and the demand for labor, $\Delta L^s - \Delta L^d$) will be the result of the process described above (i.e., firms substitute capital for labor in an attempt to increase productivity with a view to maintaining their profit rates). It appears as the gap or disequilibrium between the employment capacity generated by accumulation and the level of employment allowed by the population of working age.

Given the above considerations, the change in the unemployment rate is a function of the change in expected profitability and the change capacity utilization, i.e., $\Delta upr = f(\Delta P, \Delta r^e, \Delta uticap)$ with expected signs $f_{\Delta P} > 0$, $f_{\Delta r^e} < 0$ and $f_{\Delta uticap} < 0$. And in the words of Malinvaud: "The relation between unemployment and profitability is not an instantaneous one but involves the process of capital accumulation: too low profitability might explain why the development of productive capacities has not kept pace with the progress of the labor force" (Malinvaud 1982, p.2). And a long-run unemployment equation to include these arguments is:

$$upr = f\,(P,\ r^e,\ uticap) \qquad (6)$$

where "upr" denotes the unemployment rate (level), with $f_P > 0$, $f_{r^e} < 0$ and $f_{uticap} < 0$.[23] In terms of Blanchard's categorization of shocks versus institutions, the rate of capacity utilization operates as a shock, and it is a source of persistence (Bean 1994, pp.612–614). On the other hand, the profit rate is both an institution and a shock.

4. Unit Root and Systems Cointegration Analyses

The first step in the modeling process consists in testing the order of integration of the three series.[24] Results of the Augmented Dickey-Fuller (ADF) tests of the series are shown in the upper part of Table 1. They indicate that the four series are well characterized as random walks.

However, in the case of the unemployment rate, the series might have a structural break in 1977, the year the statistics suffered an important methodological revision and changed. Figure 4 shows the recursive estimates of upr_{t-1} in the ADF regression.[25] It seems to provide evidence that there could be a break in 1977. However, for the period 1978–1998, the unemployment rate seems to be trend stationary.[26] This would seem to indicate that the unit root in the unemployment rate is induced by the break.

For this reason, the test for the presence of a unit root was also carried out using Perron's (1989, 1993) models and critical values. Though it seems that this case corresponds to Perron's Model A, i.e., the crash model (one time change in the intercept of the trend function), I tested also the other two models dis-

Table 1

Unit Root Tests

AUGMENTED DICKEY-FULLER TEST. 1970-98: $\Delta y_t = \mu + \beta t + \phi y_{t-1} + \Sigma_{i=1}^{k} \theta_i \Delta y_{t-i} + \varepsilon_t$		
SERIES	k	ADF TEST
PROFIT RATE (r)	1	I(1); RW no drift
UTILIZATION CAPACITY (uticap)	1	I(1); RW no drift
UNEMPLOYMENT RATE (upr)	1	I(1); RW no drift
UNEMP. RATE 1978-98	2	I(0); Trend stationary
POPULATION	1	I(1); RW no drift
Series in natural logarithms; RW stands for 'random walk'		

PERRON'S TESTS FOR A UNIT ROOT. UNEMPLOYMENT RATE. 1970-98						
MODEL A: $\Delta upr_t = \mu + \beta t + \delta DU_t + \gamma D(TB)_t + \phi upr_{t-1} + \Sigma_{i=1}^{k} \theta_i \Delta upr_{t-i}$						
μ	β	δ	γ	ϕ		Critical Values
-0.55 (-0.98)	-0.003 (-0.24)	0.36 (1.72)	0.55 (0.71)	-0.16 (-0.76)		-3.77: -3.76
MODEL B: $\Delta upr_t = \mu + \beta t + \delta DU_t + \gamma DT_t^* + \phi upr_{t-1} + \Sigma_{i=1}^{k} \theta_i \Delta upr_{t-i}$						
μ	β	δ	γ	ϕ		Critical Values
-0.20 (-0.43)	-0.13 (-0.89)	0.73 (4.44)	0.13 (2.88)	-0.30 (-2.13)		-3.72: -3.85
MODEL C: $\Delta upr_t = \mu + \beta t + \delta DU_t + \gamma D(TB)_t + \phi upr_{t-1} + \tau DT_t + \Sigma_{i=1}^{k} \theta_i \Delta upr_{t-i}$						
μ	β	δ	γ	ϕ	τ	Critical values
0.1 (0.18)	-0.13 (-0.96)	0.61 (3.10)	0.74 (1.11)	0.13 (2.99)	-0.18 (-1.03)	-3.99: -4.17

Note: t-statistics in parenthesis; T=29 (1970–98); T_B=8 (1970–77); λ=0.275. k=1. Critical values for ϕ (0.05 level), for Models A and C are taken from Perron (1989) tables IV.B and VI.B, respectively. For Model B they are taken from Perron (1993), Table I. The two values given are for λ=0.2 and λ=0.3.
DU_t=1 if $t>T_B$, 0 otherwise; $D(TB)_t$=1 $t=T_B+1$, 0 otherwise; $DT^*_t=t-T_B$ if $t>T_B$, 0 otherwise; DT_t=t if $t>T_B$, 0 otherwise.

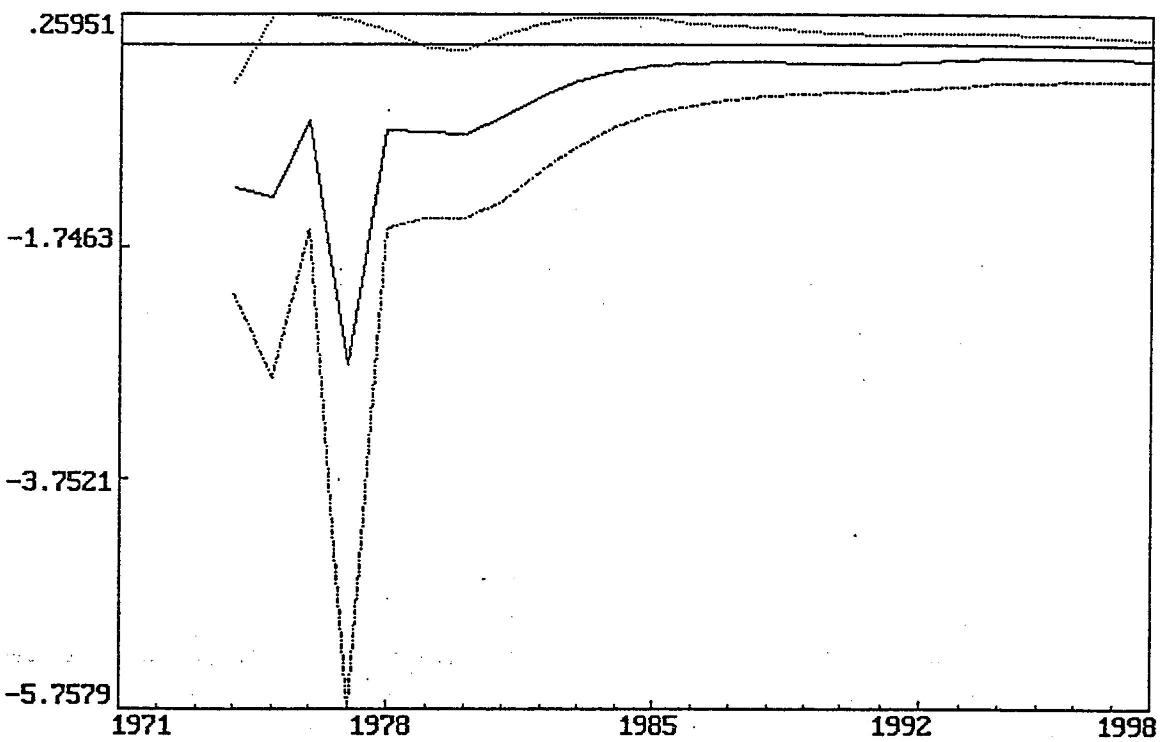
cussed in Perron (1989). Results are shown in the lower half of table 1. In none of the three cases the null hypothesis of a unit root is to be rejected. The conclusion is that although the unemployment rate seems to be strongly influenced by the break of the series in 1977, the tests appear to favor the random walk representation.

On the assumption that the variables are integrated of order 1, a vector error correction model (VECM) of the three series was estimated. This could be considered to be our congruent statistical system of unrestricted reduced forms. The VAR includes the three variables under study and a dummy that takes on 1 in 1977 and zero otherwise.[27] Results of the cointegration analysis are reported in the upper part of Table 2.

The results based on both the maximal eigenvalue and the trace statistics seem to indicate the existence of only one cointegrating vector. The lower half

Figure 4

Recursive OLS Estimates of upr(–1) in the ADF Regression and Two Times Their Standard Error



of Table 2 displays the normalized vectors together with the adjustment coefficients (in bold):[28]

If we impose the exactly identifying restriction and normalize the first cointegrating vector with respect to the unemployment rate, i.e., coefficient equal unity yields (variables in logarithms):[29]

$$\underset{}{upr} = \underset{(-4.81)}{-2.2624} \times r - \underset{(-3.77)}{3.7312} \times uticap$$

where the numbers in parentheses are the asymptotic t-values. This result is consistent with the model outlined, even tough the choice of normalization is arbitrary, in the sense that both profit rate and capacity utilization take on negative signs.[30] It is important to note that the results in Table 2 indicate that the unemployment rate cointegrating vector enters the unemployment equation with a coefficient (adjustment coefficient) of –0.335, while it does not appear to enter the equations for the profit rate (r) or capacity utilization (uticap) (the adjustment coefficients are zero). This is necessary for the latter two variables to be weakly exogenous in a conditional unemployment equation.

Given these results, it seems that modeling the unemployment rate conditioning on the other two variables is a sensible strategy, assuming that those other variables are weakly exogenous for the parameters of the unemployment rate equation. We will return to this issue later on.

Table 2

Johansen's Cointegration Test 1970–1998

Eigenvalues: 0.9698; 0.2523; 0.1887							
MAXIMAL EIGENVALUE				TRACE			
H_0	H_1	Statistic	C.V.	H_0	H_1	Statistic	C.V.
r=0	r=1	91.07	21.12	r=0	r≥1	104.07	31.54
r≤1	**r=2**	**7.56**	**14.88**	**r≤1**	**r≥2**	**13.00**	**17.86**
r≤2	r=3	5.44	8.07	r≤2	r≥3	5.44	8.07
Order of the VAR=3. Unrestricted intercepts, no trend. C.V. is the 95% critical value. r in this table refers to the number of unit roots. Pesaran and Pesaran (1997).							

NORMALIZED COINTEGRATING VECTORS (β') AND ADJUSTMENT COEFFICIENTS (α)						
Variable	α (Adjustment Coefficients)			β' (Cointegrating Vectors)		
upr	**0.33496**	–0.00684	–0.00881	**1**	**2.2624**	**3.7312**
r	**0.00871**	0.00382	–0.00734	–0.0284	1	–3.6696
uticap	**0.00296**	0.00483	0.00300	0.01792	–0.5990	1

Note: See Pesaran and Pesaran (1997).

5. Conditional Model Analysis

To model the dynamics and long-run of the unemployment rate jointly we estimate an autoregressive distributed lag of the three variables. Given that we have twenty-nine years, four lags should suffice to pick up the dynamics in the series, i.e., ADL(m=4,n=4;p=2), where m is the number of lags of the left-hand side variable (upr), n is the number of lags in the right-hand side variables, and p is the number of right-hand side variables (r, uticap). Thus, in levels (variables in logarithms), the model is:

$$upr_t = \alpha_0 + \sum_{i=1}^{4} \alpha_i upr_{t-i} + \sum_{i=0}^{4} \beta_i r_{t-i} + \sum_{i=0}^{4} \gamma_i uticap_{t-i} + \phi\, DUM77 + \varepsilon_t \qquad (7)$$

where e ~N(0, s²), and DUM77 is a dummy variable that takes on a value of 1 in 1977, the year the labor statistics underwent changes. Following Bårdsen (1989), Equation (7) can be rewritten as (as above, D denotes the growth rate):

$$\Delta upr_t = \alpha_0 + \sum_{i=1}^{3} \alpha_i^* \Delta upr_{t-i} + \sum_{i=0}^{3} \beta_i^* \Delta r_{t-i} + \sum_{i=0}^{3} \gamma_i^* \Delta uticap_{t-i} +$$

$$+ \alpha^+ upr_{t-1} + \beta^+ r_{t-1} + \gamma^+ uticap_{t-1} + \phi\, DUM77 + \varepsilon_t \qquad (8)$$

where $$\alpha^+ = \sum_{i=1}^{4} \alpha_i - 1 \; ; \; \beta^+ = \sum_{i=0}^{4} \beta_i \; ; \; \gamma^+ = \sum_{i=0}^{4} \gamma_i \qquad (9)$$

The long run multipliers are given by $\theta_r = \frac{\beta^+}{-\alpha^+}$; $\theta_{uticap} = \frac{\gamma^+}{-\alpha^+}$ (10)

Results are displayed in Table 3. The model displayed is the one selected after a process of model reduction where the second and third lags in the growth rates have been excluded (except for the unemployment rate). The F-test for the exclusion of the third lag of the three variables $H_0 : \alpha_3^* = \beta_3^* = \gamma_3^* = 0$ yields an insignificant F value. On the other hand, the test for the exclusion of the second lag ($H_0 : \alpha_2^* = \beta_2^* = \gamma_2^* = 0$) yields a significant test. However, this significance is induced by the (high) significance of the second lag of the change in the unemployment rate; the second lags of the other two variables are highly insignificant; for this reason, it was decided to exclude the latter two while retaining the former.

The diagnostic statistics indicate that the regression does not suffer from problems of misspecification or autocorrelation, and the fit is very high.

Given the inconclusive results regarding the order of integration of the series, I undertook the subsequent analysis following the methodology suggested by Pesaran et al. (1999), who have proposed a framework to test whether there exists a long-run relationship among the three variables within the current framework, i.e., an ADL (m,n;p) regression, irrespective of whether the variables are I(1) or I(0). The test is simply an F-statistic for the significance of the lagged levels of the variables in the autoregressive distributed lag for, i.e., H_0: $\alpha^+ = \beta^+ = \gamma^+ = 0$. However, the asymptotic distribution of this F-test is non-standard. Pesaran et al. (1999) have tabulated the appropriate critical values for different numbers of regressors, and have provided a band of critical values assuming that the variables are I(0) or I(1). The result of the test, shown in Table 3, yields $F(3, 15)=188.57$. In this case, the corresponding band of critical values for a significance level of 0.01 is 5.15 to 6.36 (Pesaran et al. 1999, Table C1.iii). Since our calculated F-test exceeds the upper bound of the band, we reject the null hypothesis of no long-run relationship between the unemployment rate, the average profit rate, and the rate of capacity utilization. If we now consider the significance of the lagged variables in levels in the error correction models explaining the changes in the profit rates (Δr) and the changes in the utilization capacity (Δuticap), we cannot reject the null hypothesis that the level variables do not enter significantly these two equations (results available upon request). This is consistent with our findings using Johansen's procedure.

The series of predictive failure tests (test for whether or not the second period's set of observations falls within the prediction confidence interval formed by using the regression from the first period's observations) indicates that the specification is correct. And the Chow test for stability indicates that one cannot reject the null hypothesis of equality of the parameters over the two sample periods.

The results indicate that in the short-run an increase in profitability leads to an increase in the unemployment rate. On the other hand, an increase in the rate of capacity utilization leads to a decrease in the unemployment rate.[31] The long-run steady states solution yields elasticities consistent with those found with Johansen's procedure. In particular, note that a 1 percent decline (increase) in the profit rate entails a 2.43% increase (decrease) in the unemployment rate; and that a 1% decline (increase) in the rate of capacity utilization entails a 3.29% increase (decrease) in the unemployment rate.[32] To check the impact of

Table 3

Change in Spain's Unemployment Rate (Δupr)
OLS Estimates of Equation (8) 1970–1998

Variable	Estimate	t-statistic
Constant	2.7062	1.3745
Δupr_{t-1}	0.0742	3.2895
Δupr_{t-2}	0.1173	5.3377
Δr_t	0.4868	1.9908
Δr_{t-1}	1.1748	5.2934
$\Delta uticap_t$	–1.7825	–6.5700
$\Delta uticap_{t-1}$	–0.8820	–2.7821
DUM77	–1.1180	–38.706
upr_{t-1}	–0.3321	–23.129
r_{t-1}	–0.8087	–4.4625
$uticap_{t-1}$	–1.0934	–2.8368

H_0: $\alpha^*_3 = \beta^*_3 = \gamma^*_3 = 0$, $F(3, 9)=0.90$; H_0: $\alpha^*_2 = \beta^*_2 = \gamma^*_2 = 0$, $F(3, 13)=8.54$

$R^2=0.994$; D.W.=2.44; LM (χ^2_1)=3.26; RESET (χ^2_1)=0.438; NORM (χ^2_2)=0.062; HET (χ^2_1)=1.027

LM Is the Lagrange Multiplier test of residual serial correlation; RESET is Ramsey's test using the square of fitted residuals; NORM is the normality test based on the skewness and kurtosis of the residuals; HET is the heteroscedasticity based on the regression of squared residuals on squared fitted values. Critical values for $\alpha=0.05$: $\chi^2_1=3.84$, $\chi^2_2=5.99$.

Cointegration test:
H_0: $\alpha^+ = \beta^+ = \gamma^+ = 0$; F (3, 15)=188.57

Predictive-Failure test (Chow's forecast test):
1970–88, F(10,5)=0.22; 1970–93, F(5, 10)=0.42; 1970–94, F(4, 11)=0.30; 1970–95 F(3, 12)=0.13
1970–96, F(2, 13)=0.11; 1970–97, F(1, 14)=0.22

Chow's test for stability (Chow's breakpoint test) (model estimated without DUM77): 1970–85, F(10,6)=0.78

Long run solution (t-values in parenthesis), equation (10):

$$\mathbf{upr = 8.1465 - (2.4349 \times r) - (3.2919 \times uticap)}$$
$$\mathbf{(1.39) \quad (-4.34) \quad (-2.94)}$$

Long run elasticities with the model estimated for different periods (t values in parenthesis):

Period	θ_r	θ_{uticap}
1970–88	–2.27 (–1.32)	–4.93 (–1.20)
1970–93	–1.94 (–2.20)	–4.75 (–2.57)
1970–94	–2.26 (–2.74)	–3.99 (–2.35)
1970–95	–2.54 (–3.25)	–3.19 (–2.15)
1970–96	–2.54 (–3.36)	–3.12 (–2.18)
1970–97	–2.57 (–3.95)	–3.06 (–2.43)
1978–98	–1.81 (–2.67)	–3.53 (–2.92)

Note: See Pesaran and Pesaran (1997).

Table 4

Error Correction Model of Spain's Unemployment Rate
OLS Estimates of Equation (11) 1970–1998

Variable	Estimate	t-statistic
Constant	2.7062	25.986
Δupr_{t-1}	0.0742	3.5187
Δupr_{t-2}	0.1173	5.7539
Δr_t	0.4868	2.3670
Δr_{t-1}	1.1748	5.9245
$\Delta uticap_t$	–1.7825	–8.9431
$\Delta uticap_{t-1}$	–0.8820	–4.1840
DUM77	–1.1180	–41.239
ECT_{t-1}	–0.3321	–25.321
R^2=0.994; D.W.=2.44; LM (χ_1^2)=2.95; RESET (χ_1^2)=0.429; NORM (χ_2^2)=0.062; HET (χ_1^2)=1.027 The tests have the same interpretation as in Table 3.		
Predictive Failure test (Chow's forecast test): 1970–88, F(10,7)=0.216; 1970–93, F(5, 12)=0.278; 1970–94, F(4, 13)=0.243; 1970–95 F(3, 14)=0.133 1970–96, F(2, 15)=0.114; 1970–97, F(1, 16)=0.199		
Chow's test for stability (Chow's breakpoint test) (estimated without DUM77): 1970–85, F(8, 10)=0.08		
ECT = upr + (2.4349 × r) + (3.2919 × uticap)		

Note: The estimates of this table coincide with those of Table 3. This is logical, since we are estimating the same model. The standard errors of the regressions (and therefore t-values), however, differ. This is because the standard error of the regression in this table is slightly smaller. The reason is that the computer does not correct for the k degrees of freedom lost in imposing the long-run elasticities in the ECT term. Bårdsen (1989) provides the formula to correct the standard error of the regression, which leads to the same standard errors of the parameters as in Table 3.

the break in 1977, the model was estimated for the period 1978–98. The long-run elasticities of the profit capacity utilization rates are –1.81 (t-value= –2.67) and –3.53 (t-value= –2.92), respectively.[33] Long run elasticities for other subperiods are provided at the bottom of the table (complete estimation results of these cases are available upon request).

With this information, the error correction term implied by the long-run solution is:

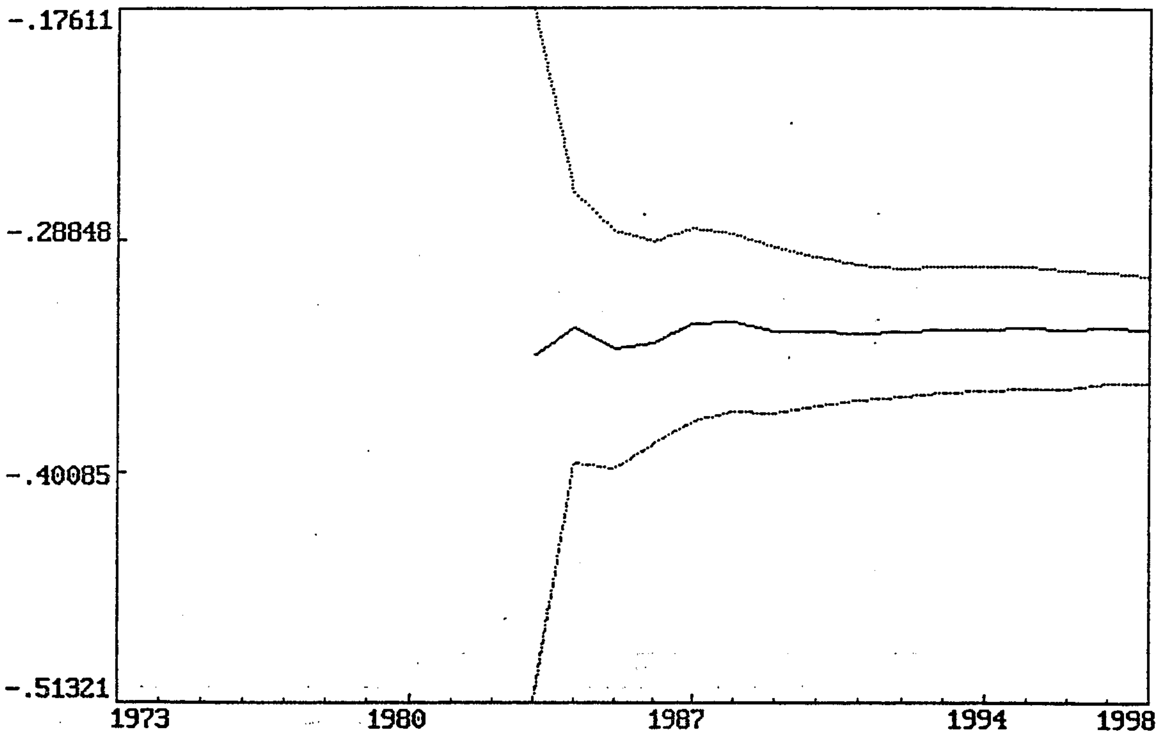
$$\Delta upr_t = \alpha_0 + \sum_{i=1}^{2} \alpha_i^* \Delta upr_{t-i} + \sum_{i=0}^{1} \beta_i^* \Delta r_{t-i} + \sum_{i=0}^{1} \gamma_i^* \Delta uticap_{t-i} + \phi\, DUM77 + \alpha^+ ECT_{t-1} + \varepsilon_t \quad (11)$$

where ECT = $(upr - \theta_r r - \theta_{uticap} uticap)$. Results of the reestimated model are shown in Table 4.

The error correction coefficient (ECT), estimated at –0.332, is highly significant, has the correct sign, and suggests a moderate speed of convergence to equilibrium. This coefficient is also consistent with our findings using

Figure 5

Recursive OLS Estimates of ECT(–1) (Equation (11)) and Two Times Their Standard Error



Johansen's procedure. The coefficient indicates that in the short-run the unemployment rate increases (decreases) by 33% of last year's shortage (excess) of the profit rate and utilization capacity over those in the long-run.

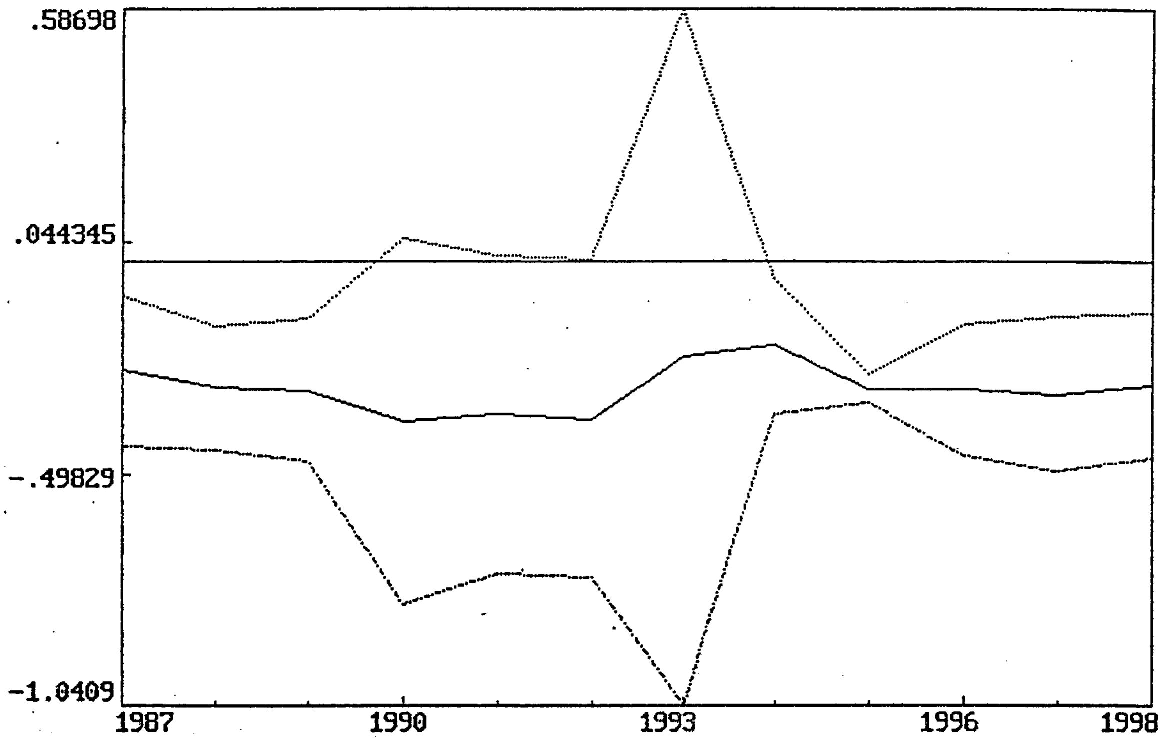
Within-sample parameter stability is a desirable property of empirical models. Figure 5 shows the recursive OLS estimates of the error correction term ECT_{t-1}, and Figure 6 displays the rolling regression estimates (estimated for 1978–1998 without DUM77 with a window size of 10 periods) of the same coefficient. Both graphs indicate stability. Finally, the Chow test for stability indicates that one cannot reject the null hypothesis of equality of the parameters over the two sample periods.

6. Exogeneity Analysis

In this section tests for exogeneity within the framework developed by Engle et al. (1983) are applied. Engle et al. introduced three notions of exogeneity depending on the purposes of the model, namely weak exogeneity, strong exogeneity, and super exogeneity; these three concepts denote properties of a variable with respect to the parameters of interest. In our case, although the parameters of interest are the long-run coefficients, we test for the exogeneity of both short and long run parameters. Performing this series of tests is important in order to ascertain whether the equation estimated in Section 5 can indeed be used for hypothesis testing, forecasting, and policy analysis. Of particular relevance is the notion of strong exogeneity, since it is related to the

Figure 6

Rolling OLS Estimates of ECT(–1) (Equation (11)) and Two Times Their Standard Error (Window Size = 10)



Lucas critique of econometric models. In the light of this critique, quantitative policy analysis can proceed only if the coefficients of the estimated model do not vary with alternative policy regimes.

6.1. Weak Exogeneity

This is the fundamental concept in econometric modeling. Weak exogeneity of the current-period regressors is required for estimation and hypothesis testing. A variable is said to be weakly exogenous for the parameters of interest if the latter are only functions of the parameters of the conditional model, and if the parameters of the conditional and marginal models are variation free (i.e., there are no cross restrictions between conditional and marginal models). We already saw that systems estimation using Johansen's technique supports weak exogeneity, since the unemployment error correction term does not appear to enter the equations for the profit and capacity utilization rates (the weights in the α matrix are zero). To further confirm this result in the context of our conditional equation, i.e., a single equation error correction model, we follow Urbain (1993). Although we are mostly concerned with the long-run parameters, we take both short and long-run parameters to be the parameters of interest. Then weak exogeneity requires: (i) the absence of the cointegrating vector in the remaining equations; and (ii) the usual orthogonality condition. The two can be tested jointly. One has to fit unrestricted reduced error correction models for Δr and Δuticap (these are the marginal models), to which we have to add

Table 5

Tests for Weak and Strong Exogeneity

WEAK EXOGENEITY		
Δr		
ECT_{t-1}	$\hat{e}_t$	F-weak
–0.0084 (–0.45)	0.019 (0.06)	H_0: ECT_{t-1} ; $\hat{e}_t = 0$ F(2,16)=0.10
R^2=0.28; D.W.=2.00; LM (χ^2_1)=0.12; RESET (χ^2_1)=1.34; NORM (χ^2_2)=1.39; HET (χ^2_1)=0.0006		
Δuticap		
ECT_{t-1}	$\hat{e}_t$	F-weak
–0.0022 (–0.138)	0.051 (0.186)	H_0: ECT_{t-1} ; $\hat{e}_t = 0$ F(2, 16)=0.028
R^2=0.45; D.W.=2.17; LM (χ^2_1)=0.66; RESET (χ^2_1)=1.40; NORM (χ^2_2)=2.23; HET (χ^2_1)=1.13		
STRONG EXOGENEITY		
Δr	H_0: $\Delta upr_{t-1} = \Delta upr_{t-2} = 0$ F(2, 17)=0.29	H_0: $ECT_{t-1} = 0$ t = 0.46
Δuticap	H_0: $\Delta upr_{t-1} = \Delta upr_{t-2} = 0$ F(2, 17)=0.247	H_0: $ECT_{t-1} = 0$ t = –0.15

Note: t-statistics in parenthesis. The diagnostic tests have the same interpretation as in Table 3.

the fitted residuals of the error correction model in Table 4 ($\hat{e}_t$), and the error correction term (ECT_{t-1}), and then test whether they are jointly equal to zero. For empirical purposes, this is just a simple F-test. Results are shown in the upper part of Table 5. The table only reports the coefficients of the ECT and the fitted residuals, as the other estimated coefficients are of no interest for our current purpose.[34] The statistics on the error process are also shown. No significant misspecification seems to affect these marginal models. Also note that the estimates of the error correction terms are very similar to the adjustment coefficients in Table 2.

The last column shows the F-test for the joint null hypothesis that the coefficients of the added fitted residuals and the error correction term are zero, i.e., an F-test for the null hypothesis of weak exogeneity of the corresponding variable for both the short and long-run parameters of the unemployment rate equation. As shown in Table 5, the null hypothesis that profit rates and capacity utilization are weakly exogenous for the parameters of interest cannot be rejected.

6.2. *Strong Exogeneity*

This is the relevant concept for forecasting. A variable z_t is said to be strongly exogenous with respect to another one y_t (left-hand side of the conditional equation) for the parameters of interest, if z_t is weakly exogenous for the parameters of interest, and if past values of y do not Granger-cause z_t (i.e,. past values of y are excluded from the set of variables explaining z_t). Testing for strong exogeneity consists in testing for weak exogeneity, and then for Granger causality. Granger (1988) pointed out that if a pair of series is cointegrated, then there must be Granger-causation in at least one direction via lagged levels. Hence, the standard Granger-causality test has to be extended to test whether the coefficient of the error correction term is significant in the marginal processes for Δr and Δuticap. Results are shown in the lower half of Table 5. In neither case can we reject the null hypothesis that past growth rates of unemployment do not Granger-cause the other two variables; and likewise, the error correction term is not statistically significant. Therefore, we conclude that the conditional equation for the unemployment rate derived in Section 5 can be used for forecasting (conditional on forecasts of the profit rate and the rate of capacity utilization).

6.3. Super Exogeneity

The notion of super exogeneity is the crucial one for policy analysis. As indicated above, it is directly related to the Lucas critique. Lucas (1976) questioned the usefulness of econometric models for policy analysis on the basis that the parameters of an econometric model are dependent on specific policy actions and institutional structures, thereby invalidating any conclusion as policies or institutions change. Lucas's argument was that shifts in economic policy change how policy affects the economy because agents are forward, rather than backward looking and adapt their expectations and behavior to the new policy stance. Thus, past behavior can be a poor guide for assessing the effects of policy actions. The implication is that reduced-form econometric models cannot provide useful information about the actual consequences of alternative policies because the structure of the economy will change when policy changes.

Engle et al. (1983) introduced the concept of super exogeneity and argued that it could be used to test the empirical relevance of the Lucas critique. A variable is said to be super exogenous for the parameters of interest (and with respect to the class of changes occurring in the sample) if it is weakly exogenous for the parameters of interest, and the latter are invariant to changes in the parameters of the marginal model. This requires constant parameters in the conditional unemployment rate equation across different economic regimes. The discussion in previous sections provides evidence in this sense. Nevertheless, we still have to show that the marginal processes for the profit and capacity utilization rates are not constant. This way, if the marginal processes of this period's variables change while the conditional model remains constant, then super exogeneity holds, and the Lucas critique does not apply for the relevant class of interventions (Hendry 1988). To test for super exogeneity we proceed in three steps. First, we fit the marginal models for the profit rate and the rate of utilization capacity. Second, we introduce dummies to model the nonconstancies of the marginal models. Third, we show that the determinants of the marginal models' nonconstancies are statistically insignificant in the conditional equation.[35]

Results of the testing process are summarized in Table 6. The first two regressions are the marginal models for Δr and Δuticap. Recursive estimation

Table 6

Tests for Super Exogeneity

EQ.	C	Δr_{t-1}							
1 Δr	−0.008 (−1.32)	0.206 (1.06)							
R^2=0.042; D.W.=2.04; LM (χ_1^2)=0.29; RESET (χ_1^2)=0.05; NORM (χ_2^2)=0.33; HET (χ_1^2)=0.34									
	C	Δuti_{t-1}	Δuti_{t-2}						
2 Δuticap	−0.004 (−0.77)	0.251 (1.48)	−0.471 (−2.76)						
R^2=0.28; D.W.=1.94; LM (χ_1^2)=0.04; RESET (χ_1^2)=0.13; NORM (χ_2^2)=0.64; HET (χ_1^2)=0.11									
	C	Δr_{t-1}	D75	D81	D84	D94			
3 Δr	−0.006 (−1.42)	0.29 (2.19)	−0.072 (−3.66)	−0.05 (−2.55)	0.062 (3.15)	0.04 (2.04)			
R^2=0.64; D.W.=1.99; LM (χ_1^2)=0.002; RESET (χ_1^2)=0.043; NORM (χ_2^2)=0.62; HET (χ_1^2)=1.73									
	C	Δuti_{t-1}	Δuti_{t-2}	D74	D75	D92	D93	D94	D97
4 Δuticap	−0.001 (−0.28)	0.146 (1.03)	−0.415 (−2.91)	−0.035 (−1.77)	−0.036 (−1.79)	−0.048 (−2.61)	−0.043 (−2.21)	0.046 (2.34)	0.045 (2.36)
R^2=0.76; D.W.=2.46; LM (χ_1^2)=2.77; RESET (χ_1^2)=0.34; NORM (χ_2^2)=0.023; HET (χ_1^2)=3.18									
SIGNIFICANCE OF THE DUMMIES AND ERRORS IN THE CONDITIONAL MODEL:									
H_0: D75=D81=D84=D94=0; F(4, 13)=1.90									
H_0: D74=D75=D92=D93=D94=D97=0; F(6, 11)=0.95									
H_0: D74=D75=D81=D84=D92=D93=D94=D97=0; F(8, 9)=1.45									
H_0: $\hat{u}_r = \hat{u}_r^2$=0; F(2, 15)=2.44									
H_0: $\hat{u}_{ut} = \hat{u}_{ut}^2$=0; F(2, 15)=0.35									
H_0: $\hat{u}_r = \hat{u}_r^2 = \hat{u}_{ut} = \hat{u}_{ut}^2$=0; F(4, 13)=1.18									

Note: 'C' is the constant term. t-statistics in parenthesis. The diagnostic tests have the same interpretation as in Table 3.

and rolling regressions indicate the lack of constancy of the parameters. The next step is to model the nonconstancies of these two models. This is done by introducing dummies, denoted Di (where i is the year). The dummies for Δr are D75, D81, D84, and D94; and for Δuticap D74, D75, D92, D93, D94, and D97. All dummies are significant. Now, the test for super exogeneity can be conducted in two ways (Engle and Hendry 1993). One, adding the dummies in regressions (3) and (4) (in Table 6) to the conditional model in Table 4, and testing their significance. Second, adding functions of the residuals of Equations (3) and (4) (in Table 6) to the conditional model in Table 4, and testing their significance.

For the first of these two tests, the two sets of dummies were added to the conditional model independently as well as simultaneously (a total of three sets of tests of dummies). In all three cases the dummies were insignificant (the F-tests for their exclusion have very low values).

The second test is for the exclusion of the residuals of Equations (3) and (4), denoted $\hat{u}_r$ (from the profit rate equation) and $\hat{u}_{ut}$ (from the capacity utilization equation), respectively, in the conditional model. In each case we included the estimated residual and its square. As before, we added independently the residuals of (3) and (4), and all of them (a total of three sets of tests). Again, they were insignificant.[36]

7. Conclusions

This paper has explored empirically the relationship between unemployment and profitability in Spain in an attempt at understanding Spain's high and persistent rate of unemployment. The paper has proposed the idea that there is an inescapable long-run unemployment-profit rate trade off. The rationale behind this relationship is that firms are constantly immersed in a spiral of capital accumulation with a view to increasing productivity, and a decrease in the profit rate. In their attempt to stay competitive in the market and in their constant fight with other firms for markets, firms try continually to increase the productivity of labor. This is mostly done through further investment. But the increase in the capital stock entails a secular decrease in the profit rate. When profit rates decrease, firms do not hire and even reduce employment, so that further increases in the capital stock are necessary to increase labor productivity. Thus, in the final analysis, unemployment arises as a consequence of the increase in capital intensity of production, and during the struggle over the distribution of income; the latter is reflected in the requirement to obtain a predetermined profit rate on the invested capital. This process is inherent to all firms in a market economy. In the case of Spain, the growing capital intensity of production that began in the 1960s was intended to raise labor productivity and lower total unit costs. However, mechanization raised the capital requirements per unit of output, and reduced profitability. The fruits of industrialization were dissipated under the rug of chronic unemployment.

The paper posits that the demand for labor is a function of the determinants of investment, namely the profit rate, and the rate of capacity utilization (the supply of labor is exogenous). A conditional model for the unemployment rate has been derived. Weak, strong and super exogeneity tests have been performed. The results indicate that the model can be used for hypothesis testing, forecasting and policy analysis. The latter implies that the reduced form estimated can provide useful information about the actual consequences of alternative unemployment policies. The model has the property that it contains an error correction term that relates the long-run unemployment rate to the average profit rate of the economy, and the rate of capacity utilization. The long run elasticities are –2.43 and –3.29, respectively (over the base values).

From an empirical point of view the results indicate that reducing unemployment in Spain to a level below 10% will be a very tough issue; certainly not achievable in the short-run.[37] Recent reports (October 2001) indicate that the unemployment rate has declined to around 13% of the labor force. But this is the best Spain has been able to do. Moreover, there are two reasons for a caveat. First, most of the jobs created during the last year were in the construction sector. It is well known that the performance of this sector depends on the business cycle. The second reason is that most of the people who got jobs were offered fixed-term contracts. This half-hearted reform was designed to make hiring easier with the least amount of disruption to insiders. In fact Spain has one of the highest rates of fixed-term contracts in Europe (33% of total employment). Due to this, the cost of laying off a worker is nil, and many of these jobs are the result of bringing to the surface employment in the underground economy. The "growth model" implemented in Spain during the last few years was not based on technical progress and skilled labor, but on low wages; and the international conditions until 2001 were responsible for the increase in the rate of capacity utilization and the reduction in interest rates. Given this, it is not clear that when the next recession hits Spain the unemployment rate will not go back to previous levels.

Although the arguments in the paper somehow imply that there is not much government policies can do to increase the rate of profit, tackling unemployment in Spain requires a change in emphasis from focusing on labor market rigidities to emphasizing macroeconomic policies (Palley 1998), and advocating a substantial increase in capacity-creating investment. Many of the measures being currently discussed, such as the emphasis on education, training, and labor-market reform, are not entirely misplaced. However, such measures are likely to be more effective at job creation if they are accompanied by a substantial investment in productive capacity. However, Moseley argues that "expansionary government policies may even exacerbate the problem of insufficient profitability, because they require that a greater share of surplus-value be used to pay for these expansionary policies" (Moseley 1997, p.37). Since Spain is working at around 80% of capacity, there is still some room for an increase in capacity utilization without overheating the economy.

Notes

I am indebted to Jerry Adams, Willie Belton, Julian Perez, Manuel Roman, Anwar Shaikh, the participants in the International Affairs Seminar at the Georgia Institute of Technology, and in the Sixth International Post Keynesian Workshop (Knoxville, Tennessee, June 23–28, 2000) for useful discussions and comments on a previous version. An anonymous referee provided very useful suggestions. I acknowledge financial support from the Center for International Business Education and Research (CIBER) at the Georgia Institute of Technology. The usual disclaimer applies.

1. This is the normalized unemployment rate, calculated by subtracting the mean and dividing by the standard deviation.
2. The connection between profit rate and the rest of the economy via investment is widely acknowledged (ask Bill Gates). However, this variable plays a much more prominent role in classical analyses (Ricardo 1981, and Marx 1977, 1981, 1982) than in neoclassical economics.
3. Dolado et al. (1986) and Andrés et al. (1990) provide discussions of unemployment in Spain within the neoclassical framework.
4. Glyn and Salverda (2000) argue that, empirically, different measures of labor-market inflexibility are insignificant in the regression explaining the difference between the employment rate of the best educated and the employment rate of the least educated.
5. Certainly unemployment insurance and subsidies in Spain are not tremendously generous in terms of paying very high pensions. What, on the other hand, is probably true is that the system provides minimum pension payments to individuals who have worked for a very short period of time and who have barely contributed to the system. Also, Spain' minimum wage rate is one of the lowest in the European Union (eight countries in the Union set a minimum wage), at 506 euros, compared with 1,282 euros in Luxembourg. Spain's mini-

mum salary is only 35.5% of the country's average salary, the lowest percentage in the Union.

6. Rowthorn (1999) tries to show that there are problems with the work by Layard et al. (1991). These authors show that investment has no permanent effect on unemployment. Rowthorn argues that the reason behind this conclusion is that the authors used a Cobb-Douglas production function, which implicitly has an elasticity of substitution between capital and labor of unity. He works with a CES production function with an elasticity of substitution below unity and is able to show that investment has a long-run impact on unemployment. However, his analysis has important neoclassical features in that he assumes that the marginal product of labor is the demand-for-labor schedule, and thus the labor share is determined exclusively by the technology.
7. Rowthorn (1995), on the other hand, argues as follows: "In the 1970s organized labour was strong enough in most OECD countries to resist the burden of higher taxes and oil prices, and it sought to pass this burden on to the employers by gaining higher wages. Part of this additional wage costs were in turn passed on to consumers in the form of higher prices, while another part was absorbed by firms themselves. The result was an inflationary spiral in which the burden of higher taxes and primary product prices was dynamically shared out among workers and employers. Governments eventually stepped in to halt this spiral by deflationary measures which provoked an economic crisis. This caused profits to be squeezed still further as capacity utilization fell" (Rowthorn 1995, 35–37).
8. This is the normalized profit rate, calculated by subtracting the mean and dividing by the standard deviation. Some caution must be exerted in drawing the conclusion that the profit rate shows a downward trend. Regression of the profit rate on a time trend indicates a statistically insignificant coefficient (when serial correlation is taken care of). The conclusion remains when the regression controls for capacity utilization. As documented in Section 4, the profit rate series is a random walk.
9. This is a gross profit rate. We do not correct it for self-employment, as Glyn (1997) does. He nevertheless argues that this should not make a huge difference in time-series analyses (Glyn 1997, 494).
10. By constant I simply mean that there is no visible upward of downward trend (the series contains a unit root). Note Spain's low labor share, around 50%, when in other developed countries it is around 70%. The labor share in Spain peaked in the period 1976–79, 0.54 (minimum value of 0.47 in 1970). Even now it is still three percentage points below that maximum. The coefficients of variation of the labor share, capital-labor ratio, and labor requirement are 0.034, 0.251, and 0.193, respectively.
11. Regressing the growth rate of labor productivity on the growth rate of the capital-labor ratio for 1970–1998 yields a coefficient of 0.65 (t-value=6.61), with an R^2 of 0.62. The relationship is also highly significant for 1970–1980 and 1991–1998, but less so for 1980–1990.
12. Gordon (1997) introduces the idea of the unemployment-productivity trade-off. Bean (1997) in his discussion of Gordon's article argues that the latter's model is, in fact, a re-working of the 'battle-of-the-mark-ups' model.
13. It can be shown that while more heavily capitalized methods of production may benefit individual firms by lowering their unit costs of production, they nonetheless also tend to lower the average rate of profit for the economy (Shaikh 1987). Therefore, the same factor which fuels competition among firms also produces a slow but steady downward drift in the economy-wide average rate of profit.
14. One could ask whether profit rates fall continuously until they reach zero. The answer is no (Gillman 1958, Marx 1982). The fall in the profit rate must be viewed only as a long-run tendency. Furthermore, the rate of profit being discussed is that for the average of the economy; therefore, it does not mean that profit rates are falling continuously in all firms. Besides, there are counteracting forces that are permanently at play. These forces not only prevent the profit rate from falling, but make it actually rise at times. One such force is the formation of monopolies, and concentration and centralization of capital in general. Large firms displace smaller ones (on efficiency grounds). In the case of Spain this tendency appeared very clearly during the 1980s with mergers of commercial banks, and with the establishment of huge retailers. Another mechanism preventing or decelerating the de-

crease in the profit rate is foreign investment, in particular to developing countries. Spanish companies concentrate their investments in Latin America.

15. See Felipe and Fisher (2003). Likewise, Thurow (1975) questioned the interpretation of tests of the marginal productivity theory of factor pricing (see Thurow's 1975, 211–30, "Do-It-Yourself Guide to Marginal Productivity") Are workers paid their marginal product at each instant of time, or are they only paid their marginal product over their entire working life?; is it individual workers who are paid their marginal product, a group of workers, or everybody? And Lavoie (2000) has shown how some widely used unemployment specifications derived by Layard et al. (1991), e.g., the relationship between increases in real wages and unemployment, can be easily derived by manipulating the income accounting identity according to which value added equals the wage bill total profits, thus depriving them from their alleged behavioral interpretation (on this see also Felipe and McCombie 2001).
16. A regression of the growth rate of employment on the growth rate of the stock of capital (with lags) yields a coefficient of 0.52, much in line with the results of Rowthorn (1995).
17. Above we referred to Fisher's (1993) work and the aggregation problem. The aggregates investment and capital stock used here do not suffer from the aggregation problem because they are not thought of as derived from a well-behaved production function.
18. In neoclassical models investment is a negative function of the interest rate. The argument is that when real interest rates (determined by the monetary policy) are high the cost of borrowing may be high enough to discourage an attractive project, although a rise in interest rates may not affect investment if a higher level of activity also raises the profitability of investment. High interest rates also act as a lure for the wealthy to use their funds not in building new capacity but to engage in financial speculation and corporate mergers, as occurred in Spain during the second half of the 1980s. However, why investment should be a negatively elastic function of the interest rate is something on which there is considerable disagreement, and many economists are skeptical about the idea that the rate of interest exerts a significant influence of investment. This position is based on the damaging conclusions of the Cambridge-Cambridge capital debates for the neoclassical theory of investment (Petri 1999, pp.52–53). Furthermore, Chirinko (1993, p.1906) finds that the empirical evidence is not clear. For this reason, this variable is not considered in the empirical analysis. In fact, none of the measures of the cost of funds used proved to be satisfactory.
19. From a policy perspective there is a critical trade-off that must be considered (Gordon et al., 1994). This trade-off is between the desire to achieve a high rate of capacity utilization to transform a high profit share into a high profit rate, and to stimulate investment; and the desire to maintain a low rate of capacity utilization to sustain high unemployment as a way of maintaining labor discipline (as a mechanism contributing to a high profit share).
20. The index of capacity utilization that I use is for the industrial sector (provided by Julian Perez). As far as I know there is no such index for the overall economy.
21. It is important to understand the converse statement: raising the profit share will not secure a higher profit rate unless the latter is accompanied by a high level of capacity utilization.
22. It is thus important to understand the relationship between the two mechanisms at work. On the one hand, a higher profit rate induces higher investment, and thus a higher stock of capital, and a higher demand for labor; on the other, a higher capital stock induces a reduction in the profit rate.
23. For empirical purposes we work with the "actual" profit rate, not the expected one. Modeling the latter is beyond the scope of this paper.
24. Data were provided by Julian Perez of the Lawrence R. Klein Forecasting and Research Center (Madrid, Spain). All data are from the original sources, i.e., National Accounts and Labor Statistics. The stock of capital was computed following perpetual inventory.
25. This regression does not include any lagged terms of the dependent variable.
26. In this regression I could not eliminate the autocorrelation. The final regression contained two lags. The time trend was insignificant, while the constant was significant.
27. One could argue that the dummy variable should take a value of zero for the period 1970–1976, and unity thereafter. However, in the light that the unemployment statistics are cur-

rently being revised, as pointed out above, and that it is not clear yet the impact of this revision, I decided to leave the dummy only for 1977. This is an issue to consider in future work. Likewise, in 1977, government, opposition and unions signed the Moncloa Pact to stabilize the economy.

28. The pre-normalized values of the cointegrating vector are –0.60176, –1.3614, –2.2453.
29. It must be noticed that this relationship does not include the population variable. The reason is that its inclusion in the analysis always led to very poor results. When the variable was significant, it had the opposite sign; and when it had the correct sign, it was insignificant. I also tried with population in absolute terms (i.e., number of people 16–65 years old), but results did not improve. This would seem to imply that unemployment in Spain has to do not so much with the evolution with the labor force as with the loss of jobs. However, this could be the result of the multicollinearity that exists between the three regressors, population, capacity utilization, and profit rate. The bivariate correlations are above 0.7. The R^2 of the regression of population on the other two regressors is 0.674. This implies a variance inflation factor (VIF) score on the population variable of 3.06. Though this score is not excessively high, population was eliminated from the analysis. The other two VIF scores are of similar magnitude. I am thankful to a referee for pointing this out.
30. As suggested by a referee, the normalizing restriction that (1, 2.2624, 3.7312) belongs to the space spanned by the cointegrating vectors was tested using a likelihood ratio. The test is a χ^2_2 with a value of virtually zero. Thus it cannot be rejected.
31. This finding is inconsistent with the theoretical arguments.
32. These percentages are over the base rates. Thus, for example, an increase in capacity utilization of 1% when capacity utilization is 75% implies a rate of capacity utilization of 75.75%; and an increase in profitability by 1% when the profit rate is 18%, implies 18.18%.
33. And for the complete period 1970–1998, but without including the dummy, the two elasticities take on values –3.49 (t-value = –0.51) and –1.41 (t-value = –0.1). Although they are insignificant, they still have negative signs and reasonable point estimates.
34. The models estimated were VAR_s (with two lags including the three variables and DUM77) in first differences. The results are robust to slightly different specifications of the marginal models.
35. A word of caution. In a recent paper, Lindé (2001) finds that superexogeneity tests used to identify the relevance/non-relevance of the Lucas critique do not have enough power in small samples. The test tends to fail because "testing for super exogeneity involves the use of "conditional" models. In such models, we typically do not condition on all shocks that hit the economy and affect parameter stability" (Lindé 2001, 1002). On the other hand, Stanley (2000) performs meta-analysis and concludes that indeed the Lucas critique does not have empirical support.
36. Some caution must be exercised here for $\hat{u}_r$ is significant.
37. The steady-state solution in Table 3 indicates that an unemployment rate of around 10% could be achieved assuming that capacity utilization goes up to around 100%, and if the profit rate goes up to around 37%.

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