UNEMPLOYMENT AND WAGES IN PORTUGAL*

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1. INTRODUCTION

The recent behaviour of the Portuguese labour market can be described as follows:

- Unemployment reacts predictably and with a lag to fluctuations in economic activity, namely to deviations of output from its trend. The labour market may, therefore, be characterised by a stable Okun relation.
- Nominal wages react significantly to changes in the inflation rate and in the unemployment rate. Wage adjustment is therefore (partial) substitute for adjustment in employment/unemployment, lessening the relevance of the latter.
- Many labour market variables are correlated with the economic cycle, sometimes with a significant lag\(^{(1)}\).

The aim of this study, which is related to previous work (namely Marques (1990), Modesto, Monteiro e Neves (1992), Luz and Pinheiro (1993, 1994) and Modesto (1997)\(^{(2)}\), is to examine some of these stylised facts, namely regarding unemployment, nominal wages, real wages and productivity and their relationships with the economic cycle. It focuses on the relationship between the unemployment rate and the economic cycle (Okun Law) and between wages and unemployment (Wage Curve).

Our results confirm:

i) that changes in unemployment are quite sensitive to the economic cycle, which is consistent with the findings in Modesto, Monteiro and Neves (1992) and in Luz and Pinheiro (1993);
ii) the existence of a long-run relationship between real wages — measured in units of efficiency — and unemployment levels;
iii) the existence of stable Okun and Wage relationships, which is consistent with a stable natural rate of unemployment for the last 15 years. The estimated natural rate of unemployment stands close to 6 per cent, regardless of the relationship used in its estimation.

The following section presents the model and the estimated Okun equation. Section 3 exhibits the results for the Wage Curve. Lastly, the fourth section makes an appreciation of our findings.

2. THE OKUN LAW: RELATIONSHIP BETWEEN UNEMPLOYMENT RATE AND ECONOMIC CYCLE

In Portugal, evidence indicates a robust relationship between the deviations of output from its trend (the output gap) and deviation of unemploy-
ment from its natural rate. Modesto, Monteiro and Neves (1992) and Luz and Pinheiro (1993) estimate and present this relationship as an Okun Law equation.

However, this is not the most current formulation in literature. In fact, text books (e.g., Blanchard (1997)) present the Okun Law as relating changes in the unemployment rate to deviations of GDP growth from its trend growth rate. Deviations of the unemployment rate from the natural unemployment rate are related to deviations of aggregate demand in Modesto, Monteiro and Neves (1992) — which concludes that it is possible to infer a natural rate of unemployment — and to the deviation of GDP from its trend in Luz and Pinheiro (1993).

A NAIRU between 5.5 and 6 per cent was estimated, in the latter study using a long-run cointegration relationship. However, in this formulation, the short-run dynamics (calculated from a representation of the Engle-Granger Theorem) influence the long-run relationship decisively, due to the short sample size (quarterly data running from 1983:2 up to 1992:4).

These results were also corroborated by Modesto (1997), which estimated a natural rate of unemployment around 6 per cent, using a totally different methodology based on panel data (data from 1984 to 1995).

Marques (1990) estimates a 6 per cent natural rate of unemployment in a broad sense(3).

We test these findings with more recent data.

The estimation of the relationship between the unemployment rate and the deviation of GDP from its trend leads to:

\[ \Delta u_t = 1.52 - 0.254u_{t-1} - 0.142(y - y^p)_{t-4} - 0.076\Delta(y - y^p)_t - 0.201\Delta(y - y^p)_{t-1} - 0.246\Delta(y - y^p)_{t-2} - 0.135\Delta(y - y^p)_{t-3} \]

\[ R^2 = 0.64 \quad F = 13 \quad SER = 0.192 \quad DW = 1.42 \]

where \( u \) stands for the unemployment rate, \( y \) is GDP in logarithms, \( y^p \) is trend GDP in logarithms and \( \Delta \) is the year-on-year difference (see Appendix for a description of the data). The resulting long-run relationship can be written as follows:

\[ u_t = 6.00 - 0.559(y - y^p)_{t-3} \]

pointing to a natural rate of unemployment close to 6 per cent. For an observed output one per cent above its trend, this relationship yields a 0.56 percentage points decrease in unemployment. Despite some sensitivity of the short-run dynamics to the sample period — with impacts on the persistence of autocorrelation — the long-run relationship is stable even when different formulations for the short-run lag structure are used(4).

Chart 1 displays a possible interpretation of the Okun relationship. In the first quadrant we have the long-run (vertical) supply for output at its trend level, and short-run supply (positively sloped). Inflation is measured in the vertical axis.

The relationship between output and employment is depicted in the second quadrant; this relationship is obtained from a short-run production function (i.e., assuming a fixed capital stock). Normalising labour supply to equal 1, the unemployment level \( u \) is found in the third quadrant (using the -1 slope line), derived from the employment level, \( L (u = 1 - L) \); finally, the fourth quadrant presents a vertical line standing for the natural rate of unemployment (at level \( u_n \)) and a downward line relating unemployment (and employment) and short-run inflation — the short-run Phillips curve. On its turn, this line corresponds to the (constant) short-run supply depicted in the first quadrant(5).

Chart 1 suggests an interpretation of the Okun Law first suggested by Modesto, Monteiro and Neves (1992): in Portugal, observed unemployment evolves around a stable reference value (the NAIRU) according to the economic cycle.

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(3) The difference between unemployment in a broad sense and in a strict sense stands between 0.5 and 1 percentage points (Labour International Organisation).

(4) The regression uses trend GDP as a measure for potential output. Nevertheless, the results are robust to other measures for potential output. Specifically, the results are not changed significantly when the potential output is estimated through a H-P filter.

(5) This presentation follows the pioneer work of Fisher (1926), Phelps (1968) and Friedman (1968).
However, the natural rate of unemployment is not constant, and depends on real factors — including the labour market flexibility and the level of competition in the commodity market\(^{(6)}\). In Portugal, the natural rate of unemployment has remained fairly constant for the last fifteen years\(^{(7)}\).

3. THE WAGE CURVE: RELATIONSHIP BETWEEN REAL WAGES AND UNEMPLOYMENT RATE

The flexibility of real wages is one of the most frequently mentioned characteristics of the Portuguese labour market.

In particular, the real wage reacts strongly and rapidly to the unemployment rate (Modesto, Monteiro and Neves (1992); Luz and Pinheiro (1993)). To evaluate the robustness of this result, the wage curve was re-estimated according to the traditional approach, as in Blanchard and Katz (1997) and Blanchflower and Oswald (1994). Hence we have,

\[
\Delta w_t = a_0 + \lambda (w - p - f)_{t-4} + a_1 \mu_t + a_2 \Delta w_{t-1} + a_3 \Delta p_t + \varepsilon_t
\]

where \(w\) stands for the logarithm of nominal wages, \(p\) is the logarithm of the consumer price index, \(f\) is the logarithm of the efficiency index\(^{(8)}\) and \(u\) stands for the rate of unemployment. Ordinary least squares yield the following results (see Appendix for a description of the data):

\[
\begin{align*}
R^2 &= 0.94 \quad F=183 \quad SER=0.012 \quad D-halt=-0.56 \\
\Delta w_t &= -0.6766 + (-0.158)(w - p - f)_{t-4} + \\
&\quad (-3.26) \quad (-3.23) \\
&\quad +(-0.0045)\mu_t + 0.60 \Delta w_{t-1} + 0.207 \Delta p_t, \\
&\quad (-2.65) \quad (-3.23) \quad (3.77)
\end{align*}
\]

Using the long-run relationship (below) and defining \(z_{wt}\) as its residual, the short-run relationship is written as follows:

\[
\Delta w_t = -0.0045z_{wt} + 0.60 \Delta w_{t-1} + 0.207 \Delta p_t,
\]

Statistical tests do not reject the hypothesis of stability of the parameters, nor the absence of autocorrelation of residuals:

\(\text{AR}(1)=5.57\), \(\text{AR}(4)=6.25\), \(\text{Chowt}=2.07\), \(\text{CUSUM}=0.92\), \(\text{CUSUMSQ}=0.375\).

On its turn, the long-run equation can be written as follows:

\[
u_t = -158.52 - 35.40 (w - p - f)
\]

which, taking the sample mean real wage as the long-run equilibrium level\(^{(9)}\), yields a natural rate of unemployment of 5.75 per cent — the null profit condition (see chart 2).

The long-run equation yields a -0.16 elasticity of the real wage vis-à-vis the employment rate,

\(\text{(8)}\) The efficiency index is calculated upon the research of Marques and Botas (1997).
\(\text{(9)}\) This is the only behaviour assumption possible.
which is similar to that presented by Modesto, Monteiro and Neves (1994), -0.14.

It is important to have some intuition concerning the size of this elasticity. Using a completely distinct methodology, Blanchflower and Oswald (1994) estimated a -0.1 average elasticity for a sample including the USA, Great Britain, Canada, Austria, Italy, the Netherlands (with the greatest value in absolute terms, -0.17), Germany and Switzerland. Results suggest a higher elasticity in Portugal than in other industrialised countries.

4. CONCLUSION

Many recent analysis including some by international organisations — such as the European Commission and the OECD — have pointed to the possibility of a structural break in the Portuguese labour market’s behaviour, reflecting convergence to the more rigid patterns prevailing in the European Community. As put by the European Commission (1997):

“When the primarily cyclical nature of the current unemployment, part of the job contraction in Portugal has been more persistent in character than in the past, suggesting that structural unemployment might also have increased. Estimates by the European Commission, for instance, point to an increase in the NAIRU of around 0.8 percentage points over the period 1988-1994. Moreover the number of unemployed for more than one year has increased sharply over the last 3 years. By the end of 1996 long term unemployment represented 42.5 per cent of total unemployment, against 26 per cent in 1992.”

The present study estimated the Okun relationships and the wage curve for Portugal; the stability of both relationships for the last 15 years was not rejected. As a result, most fluctuations of unemployment seem to be due to deviations from trend GDP — i.e., fluctuations of unemployment are basically cyclic.

We estimated a natural rate of unemployment from the Okun equation of around 6 per cent, which is low when compared to the average levels recorded in the European Union.

The wage curve leads to a 5.75 per cent NAIRU. Given the constraint associated to these estimates, this result is identical to the above one.

The real wage elasticity vis-à-vis unemployment (-0.16) is high according to the international standards. This is a significant result, and is consistent with the findings of Modesto, Monteiro and Neves (1992) and Luz and Pinheiro (1993, 1994), for periods of high (two-digit) inflation and comprising only one recession moment (1983-1984).

Results could always be seen as depending on the macroeconomic regime in force, which was characterised by high inflation and the utilisation of the exchange rate as an adjustment instrument.

The widening of the sample period up to 1996 shows that wage flexibility holds even in a context of low inflation and exchange rate stability.

This finding is very important as regards the Portuguese participation in the euro area. In fact, the real flexibility of wages is a substitute to the international mobility of labour force, a crucial element in adjusting for idiosyncratic shocks. In short, real flexibility of wages grants to the Portuguese economy an additional ability to adjust for possible unfavourable circumstances.

(10) See, for example, Buti and Sapir (1997) for a review on this issue.
APPENDIX
The data

This study uses quarterly data for the period running from 1983 up to 1996 for the following variables: unemployment rate \((u)\), output \((y)\), prices \((p)\), wages \((w)\) and productivity\((f)\).

The original sources are the INE and the Banco de Portugal; the statistical treatment, the adjustment of trend and seasonality, and the linkage of series follow procedures previously used in former studies, so these are described briefly here.

The rate of unemployment \((u)\): this variable is obtained by adjusting the unemployment series of the “Inquérito ao Emprego” of the INE for seasonality. Since methodological changes were introduced in 1992 in this survey, the series were linked by using the data on the previous year situation there included.

Output gap \((y - y^\prime)\): deviation of the logarithm of GDP (Quarterly accounts) from its trend \((y^\prime\), potential output).

Wages \((w)\): logarithm of an index \((1991 = 100)\) equaling the real growth of total wage earners’ wages (calculated by the Banco de Portugal) times the quarterly data of those wages as disclosed in the Historical Series for the Portuguese Economy.

Prices \((p)\): logarithm of total CPI excluding rents \((1991 = 100)\).

Efficiency \((f)\): index \((1991 = 100)\) built from the productivity measure presented in Marques and Botas (1997).

Symbol “\(\Delta x\)” denotes the year-on-year change rate of variable “\(x\)".
REFERENCES

European Commission, 1997, The Economic and Financial Situation in Portugal in the Transition to EMU.

32 Banco de Portugal / Economic bulletin / December 1997