REGIONAL UNEMPLOYMENT RATES IN SPAIN, 1979-2000

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1 INTRODUCTION

This paper attempts to test the Non-Accelerating Inflation Rate of Unemployment (NAIRU) hypothesis with data from the regional economies in Spain.

The NAIRU at the national level has been the goal several times aimed at, namely, by Andrés et al. (1988, 1996), Dirección General de Previsión y Coyuntura (1991), De Lamo and Dolado (1993), Jimeno and Toharia (1992), Rodríguez-Prado (1995a, 1995b), Dolado et al. (1996), Blanchard and Jimeno (1999), Bellod (1999), Montero (2000), Estrada et al. (2002), and McMorrow and Roeger (2000), amongst others. Nevertheless, this is the first time ever the NAIRU hypothesis has been tried at the regional level.

Some of these contributions estimate the NAIRU by means of multivariate models, which propound a relationship of the rate of unemployment to prices and wages. Others estimate the NAIRU straightforwardly from the relationship of the unemployment rate to the rate of inflation. Finally, Camarero et al. (2005) and Clemente et al. (2005) use univariate models, based on time-series analysis of the unemployment rates.

The approach of this paper is univariate.

2 STYLISED FACTS

Previous research on the unemployment in Spain has shown that the NAIRU is a relevant fundamental of the national economy. Also it is well known that the different Spanish regions – a total seventeen – contribute in different measure to the absolute unemployment figures and rates at the aggregate level.

On the other hand, previous research has also evidenced that the NAIRU as a fundamental of the Spanish economy is not a constant – whether in absolute or percent terms. Most papers on the topic reveal at least a structural change in the NAIRU during the period under research.

Both traits appear to point at a couple of interesting questions, to say, how do regional unemployment figures contribute to the national aggregate?, and do the regional unemployment rates share basic traits of the national rate as regard the NAIRU?

3 DATA SOURCE

The so-called Encuesta de Población Activa (EPA) – Active Population Poll – is the data source. EPA is worked out on a quarterly basis by the National Agency for Statistics (INE). It consists of a 60,000-household sample, which are gradually replaced for complete renewal. The period covered by the research encompasses the EPA series between two major methodological changes (1976*Q*3 to 2000*Q*4).

Interviewers visit the households in their residences. EPA makes no difference between nationals and immigrants, whether regular or irregular. The questionnaire is anonymous. EPA calls ‘unemployed’ every person willing to work for a wage/salary whilst unable to find it in the week previous to the

interview. EPA calls 'employed' every person working for a wage/salary for at least one hour in the week previous to the interview. Information from EPA covers a broad spectrum of related issues, including the regional breakdown of unemployment figures.

4 NAIRU OR HYSTERESIS?

The first step of the research dealt with the question of whether regional unemployment rates in Spain follow a NAIRU or, to the contrary, a hysteresis pattern. For the series to follow a NAIRU pattern, it must stand a unitary-root test according to the standard model

$$y_t = \mu + \rho y_{t-1} + \gamma t + \varepsilon_t \text{ [1]}$$

with y_{t-1} and y_t being the rates of unemployment in periods t-1 and t, and γ being the tendency of the series.

In the autoregressive model [1] the null hypothesis is $\rho = 1$. If that is true, the process is non stationary, and the pattern is hysteresis. If $|\rho| < 1$, the null hypothesis is rejected, the process is assumed stationary and a NAIRU can be estimated.

However, Phelps (1994) contended that the equilibrium rate of unemployment – he did not speak of 'NAIRU' – might not be assumed to be a constant. In terms of the model [1], the implication is that the null hypothesis could be verified despite a stationary process of limited duration might be evidenced that moved from one level to another (Perron 1989). Accordingly, unitary-root tests are suitable that leave room for structural changes in the variable.

Standard tests for H_0: I(1) of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) descriptions, plus Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test for H_a: I(0) were completed. All of them allow for structural changes.

DeJong et al. (1992) showed, however, that these tests suffer of low power. In particular, low power is a serious problem whenever structural changes – or 'breaks' – may be assumed in the series. In addition to them, the tests of Ng and Perron (2001) were used to overcome this problem. Still, the following high-power tests were used to deal with the series of some regions, which presented especial problems: Perron and Volgelsang (1992) – PV, – Zivot and Andrews (1992) – ZA – and Perron and Rodriguez (2003) – PR, – allowing for one structural change (n = 1), and Lumsdaine and Papell (1997) – LP – and Clemente et al. (1998) – CMR, – allowing for two structural changes (n = 2).

Together with this approach *à la Perron*, an alternative procedure is proposed by Lee and Strazicich (2003,2004), which entails a unitary-root test allowing for one and two structural changes – LS1 and LS2, – as based on the Lagrange Multiplier. These were also used in order to corroborate previous results.

There were the results:

Null Hypothesis	Number of breaks	Tests	Regions
Rejected	None	ADF, PP, KPSS	Aragon, Asturias, Balearic Is., Castilla&Leon, Castilla-La Mancha, Catalonia, Extremadura, Madrid, Navarre
		Ng-Perron (2001)	Andalucia, Galicia, Comunidad Valenciana
	1	PV(1992) ZA(1992) VP(1998) PR(2003) LS1(2004)	Balearic Is., Basque Country, Spain
	2	LP(1997) CMR(1998) LS2(2003)	—
Not rejected	Hysteresis		Canary Is., Cantabria, Murcia, La Rioja

Therefore, most of the Spanish regions – thirteen in seventeen – share with the national economy such a fundamental as NAIRU. Only four, minor regions showed evidence of hysteresis, that is, their unemployment rate series are autoregressive processes of the first order.

5 HOW MANY BREAKS, OF WHAT TYPE?

The second step of the research dealt with comparing the shape of the NAIRU of Spain with those of her regions, in the cases in which a NAIRU might be estimated – 13 out of a total 17.

The basic theory is Philips Curve and specification by Layard et al. (1991):

$$u = u^* - \frac{1}{\theta_1}(\Delta p - \Delta p_{-1}) = u^* + v \text{ , [2]}$$

with

$$u_t = \mu + \rho u_{t-1} + \varepsilon_t \text{ , [3]}$$

and

$$NAIRU = u^* = \frac{\hat{\mu}}{(1-\hat{\rho})} \text{ , [4]}$$

Thus it is possible, at least in theory, to estimate the NAIRU from the raw data of the series of unemployment, without recourse to either the prices or inflation series.

The procedure to estimate both μ and ρ in equation [3] in order to infer the NAIRU – u^* in equation [4] – is Bai and Perron (1998, 2003).
The results of the estimation are as follow:

Bai & Perron (1998,2003)	Structural changes – breaks – and estimated value of NAIRU						
	$NAIRU_0$	T_1*	$NAIRU_1$	T_2*	$NAIRU_2$	T_3*	$NAIRU_3$
ANDALUCIA	12.08	1979*Q*4	19.77	1983*Q*3	29.35		
ARAGON	5.30	1980*Q*4	14.06	1997*Q*2	9.81		
ASTURIAS	6.60	1981*Q*3	18.20				
BALEARIC IS.	4.88	1980*Q*3	12.26				
CASTILLA& LEON	7.29	1982*Q*3	17.43				
CASTILLA-LA MANCHA	6.33	1980*Q*2	15.79				
CATALONIA	5.99	1980*Q*1	17.93	1997*Q*2	11.86		
COMUNIDAD VALENCIANA	6.19	1981*Q*1	18.16				
EXTREMADURA	9.93	1979*Q*4	16.30	1983*Q*4	27.34		
GALICIA	4.37	1983*Q*1	12.33	1991*Q*4	17.63		
MADRID	7.49	1979*Q*4	15.47	1993*Q*2	19.94	1997*Q*2	14.33
NAVARRE	5.46	1979*Q*4	12.95				
BASQUE COUNTRY	7.33	1980*Q*3	20.55	1997*Q*2	14.99		
SPAIN	7.95	1981*Q*1	18.98				

Therefore, six Spanish regions share with the national economy a one-break pattern, in all cases to reach a higher unemployment in the 1980-1982 period.

Another eight Spanish regions display a more varied pattern.

Three of them, including Andalucia, the largest contributor to absolute unemployment, show two breaks on the increase or, so to speak, split the single break of the national economy into two subsequent ones.

Another three, including Catalonia, – possibly the most dynamic Spanish region, – also display a two-break pattern, though the first is on the increase (always in 1980) while the second is on the decrease (always in 1997).

Finally, a single region, Madrid, – the region including the capital of the state, and in dynamism second only to Catalonia, – displays the oddest, a three-break pattern. The first two are on the increase, like Andalucia and another two less-developed regions. The last break in Madrid, however, is on the increase (in 1997), which makes up a sub-pattern fairly similar to that of Catalonia and another two more-developed regions.

6 CONCLUSIONS

The quarterly series of unemployment produced through EPA supply evidence both that NAIRU is a plausible fundamental of the Spanish economy – in corroboration of previous researches – and that most regions display NAIRU. This result suggests that the national NAIRU is the resultant aggregate of the regional NAIRU.

The set may be divided, according to whether or not there is a NAIRU, and to the number and direction of the breaks, into four subsets. A first subset of four regions of minor economic significance displays a pattern of hysteresis: every unemployment rate heavily depends on the previous value of the variable.

A second subset of six medium-sized regions very tightly follows the one-break pattern of the national economy, which suffered a huge increase in the equilibrium rate of unemployment in 1980; let us call these, increase-regions.

A third subset of three regions, in which the less-developed regions belong, stretched the increase along two subsequent breaks, the first one in the early eighties, another in the mid-to-late eighties; let these be increase-increase regions.

A four subset of three regions, in which two of the more dynamic regions – Catalonia and the Basque Country – belong, show an increase-decrease pattern.

Finally, Madrid displays a unique pattern – increase-increase-decrease. It begins sharing the pattern of the less-developed regions while ends sharing the pattern of the more-developed ones.

What is even more interesting, though the less-developed regions lead the absolute amount of unemployment at the national level, it is the more-developed regions that seem to lead the dynamics of the reduction of unemployment rates. Hopefully, the national economy will display a reduction of the NAIRU in pursuance of the like movement of some regional NAIRU in 1997, provided that the former series is prolonged beyond 2000.

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APPENDIX

NAIRU value at breaks
(and *t*-Student)

Region	1st	2nd	3rd	4th	R^2
ANDALUCÍA	12.08 (7.02)	19.77 (11.90)	29.35 (37.89)		.842
ARAGON	5.30 (4.39)	14.06 (22.32)	9.81 (7.17)		.646
ASTURIAS	6.60 (5.11)	18.20 (27.00)			.771
BALEARIC IS.	4.88 (2.74)	12.26 (15.04)			.455
CASTILLA& LEON	7.29 (6.12)	17.43 (24.99)			.743
CASTILLA-LA MANCHA	6.33 (3.50)	15.79 (19.74)			.662
CATALONIA	5.99 (3.35)	17.93 (21.48)	11.86 (6.40)		.647
COMUNIDAD VALENCIANA	6.19 (5.38)	18.16 (32.19)			.660
EXTREMADURA	9.93 (6.11)	16.30 (10.73)	27.34 (37.10)		.876
GALICIA	4.37 (6.00)	12.33 (19.26)	17.63 (27.93)		.911
MADRID	7.49 (4.43)	15.47 (17.99)	19.94 (12.62)	14.33 (8.48)	.625
NAVARRE	5.46 (1.83)	12.95 (10.65)			.412
BASQUE COUNTRY	7.33 (5.67)	20.55 (31.53)	14.99 (10.51)		.781
SPAIN	7.95 (7.96)	18.98 (38.74)			.690