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UNEMPLOYMENT DYNAMICS IN SPAIN, A REGIONAL ANALYSIS WITH A MARKOV REGIME SWITCHING APPROACH

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Abstract: *The aim of this paper is to analyze the Spanish unemployment dynamics, on national and regional levels, with a Markov Regime Switching model on quarterly data from 2002 to 2020. We test for hysteresis; we estimate the transition probabilities of regime change and the relative expected durations. Our results confirms the presence of asymmetry and hysteresis in both national and regional unemployment rates, we also found that when national unemployment switches to a regime associated with higher duration and lower volatility, the same behavior is observed only in half regions. The policy implications we derive from our results are the need for more region's specific actions to increase labor and firm mobility between regions and the performance of future labor market reforms.*

Keywords: Unemployment, hysteresis, Markov regime switching, Spain.
JEL classification: E24, C34, J60.

1. Introduction

Spain undertook several labor market reforms in order to reduce the unemployment from which its economy suffers. The country presents an interesting case to study the behavior of unemployment on the national and regional levels. Unemployment in Spain rose from 7 percent in 1978 to over 20 percent in 1984 while the labor force and real wages grew in average by 0,5 percent and 1 percent respectively on the same period. This situation was originated by a weak economic growth due to the second oil crisis. Later on unemployment fell, from over 21 percent in 1985 to 16 percent in 1990 despite a growth of 2,1 percent in the labor force. This performance finds its roots in the steady economic growth of 4,5 percent in average from 1986 to 1990 following the country's accession to the European Community in 1986 and the adoption of flexible labor contracts in 1984 accompanied by a slower growth of 0,6 percent in real wages. In 1992 the Spanish economy experienced a recession which led to a rise in unemployment up to 24,6 percent in 1994 despite the slow growth of 0,7 percent in labor force. It is worth noticing that during the recession real wages kept growing in the absence of serious labor market reforms (Franks, 1997).

The OECD (1994) study suggested that high employment protection might cause high unemployment and recommended more flexibility. In that spirit the Spanish labor market reforms of 2010 and 2012 were established to promote employment by aligning wages with productivity and reducing labor market dualism. The change to employment protection legislation goal was to reduce the difficulty and the cost of fair dismissals despite the opposition of unions. The OECD (2014a) report stated that the reforms added flexibility to the collective bargaining system in Spain. Now that we are far from the 2008 crisis which caused high unemployment and triggered the reforms; it is worth noticing that even if unemployment fell, the results are quite different on a regional scale.

Unemployment analyses are generally around two theories; the natural rate and the hysteresis. Both are respectively based on the stationarity and the nonstationarity of the series; and while the economic literature on the subject is rich, it still widely divided. This is not the case for the literature on regional unemployment disparities. In fact when labor market lacks mobility and demands, low unemployment regions, are not affected by the high unemployment rates in other regions; then regional disparities in unemployment will affect the Non-Accelerating Inflation Rate of Unemployment (NAIRU) (Layard et al, 1991). A detailed interpretation of unemployment disparities between regions can be found in Marston (1985) who suggested that regional unemployment differential can be explained by two complementary types of factors known as equilibrium and disequilibrium approaches. The first approach links regional unemployment to regional equilibriums based on demand side factors such as an insufficient demand for certain region's products, or supply side factors such as a lack of qualifications in certain region's workforce and even institutional differences in legislations and union power. Thus regional unemployment disparities tend to persist in the short run since all these factors vary slowly (Adams, 1985; Topel, 1986). But on the long run the lack of labor and firm mobility is the main source of the regional unemployment differential.

The second approach links regional unemployment not to regional equilibriums but rather to a common one to all regions from which regional unemployment rates diverge with each shock due to the weak adjustment mechanisms of certain regional labor markets (Blanchard and Katz, 1992). Given the fact that the speed of absorption of these shocks differs from a region to another, an increase in regional unemployment disparities will persist (Overman and Puga, 2002).

The literature on Spanish regional unemployment differential and especially the recent one is within European studies in many cases. Rios (2017) claims that European regional unemployment disparities from 2000 to 2011 are mainly driven by regional equilibrium factors. Baussola and Mussida (2017) for the period 2007 to 2013 found that regional effects are significant, in all European countries in general and in Spain in particular, as structural factor for unemployment persistence. The literature focusing on the Spanish case generally addresses the regional disparities from a spatial approach (Villaverde and Maza, 2002; Aláez et al, 2003). Others relate these disparities to the business cycle or to region specific factors in an equilibrium approach. For Bande et al. (2008) there is a positive relationship between regional unemployment dispersion and the business cycle. López-Bazo et al. (2005) analyze the contribution of disequilibrium and equilibrium factors to regional unemployment differential. The authors found that the equilibrium factors are responsible for most of the characteristics of the geographical distribution of unemployment. Villaverde and Maza (2009) found that regional disparities in productivity growth are partially responsible for the inverse relationship between unemployment and output observed in most regions.

Many researches on the Spanish regional unemployment differential literature tackle the subject from a comparative and spatial approach in a European context. Despite the importance of their results, a country specific approach is even more appealing, given the outstanding overall unemployment evolution for the last twenty years and its response to the latest labor market reforms. Therefore we find it necessary to focus on the Spanish unemployment dynamics evolution not only from a national view but also from a regional view, as some region specific unemployment determinants might not be affected by the reforms. Our choice of the nonlinear context is justified by the work of the supporter of the hysteresis theory like Clark and Summers (1982); Ellwood (1982) and Blanchard and Summers (1986) who claim that labor market frictions alone cannot explain persistent high unemployment rates when the series display non-linearity. The Markov Switching Regimes model we use offers the possibility to not only model hysteresis but to also estimate the transition probabilities of regime change and the related average durations. The paper is organized as follows. Section 2 presents the methods. Section 3 contains the data; section 4 details the results, while Section 5 is dedicated to the concluding remarks.

2. Methods

Markov-switching models were introduced by Goldfeld and Quandt (1973) and later developed by Cosslett and Lee (1985), and Hamilton (1989). The Markov switching approach allows multiple shifts, evolving according to a Markov chain, from one set of behavior to another. We consider two first order autoregressive process regimes following the values of r_t and related by:

$$u_t = \alpha_{r_t} + \beta u_{t-1} + \varepsilon_t \quad (1)$$

Where $\varepsilon_t \sim N\,(0,\ \sigma^2)$ and r_t unobservable taking the values 1 for regime 1 defined by $u_t = \alpha_1 + \beta u_{t-1} + \varepsilon_t$ and the value 2 for regime 2 defined by $u_t = \alpha_2 + \beta y_{t-1} + \varepsilon_t$. While the probabilistic model that cause the changes from $r_t = 1$ to $r_t = 2$ is a two regime Markov model with:

$$Prob(r_t = j | r_{t-1} = i, r_{t-2} = s, \dots, u_{t-1}, u_{t-2}, \dots) = Prob(r_t = j | r_{t-1} = i) = p_{ij} \quad (2)$$

The Markov model becomes the following vector autoregressive process with 2×1 random vector η_t:

$$\eta_t = \{(1\ 0)' \quad if \quad r_t = 1; \quad (0\ 1)' \quad if \quad r_t = 2\} \quad (3)$$

If we suppose $r_t = 1$ then the first element in η_{t+1} is the random variable with the value 1 and a probability $p_{11} = 1 - p_{12}$, zero otherwise. Given that $r_t = 1$, the conditional expectation of η_{t+1} is represented in the first column of the transition matrix P:

$$E(\eta_{t+1} | r_t = 1) = (p_{11}, 1 - p_{11})' \quad (4)$$

From the equations (2), (3) and (4) we have:

$$E(\eta_{t+1} | \eta_t, \eta_{t-1}, \eta_{t-2}, \dots) = P\eta_t \quad (5)$$

Where $P = \begin{bmatrix} p_{11} & p_{21} \\ p_{12} & p_{22} \end{bmatrix} = \begin{bmatrix} p_{11} & 1 - p_{22} \\ 1 - p_{11} & p_{22} \end{bmatrix}$

Which further implies that it is possible to rewrite the Markov switching model which can be expressed as a first order vector autoregression $\eta_{t+1} = P\eta_t + v_{t+1}$, where $v_{t+1} = \eta_{t+1} - E(\eta_{t+1} | \eta_t, \eta_{t-1}, \eta_{t-2}, \dots)$ is a martingale difference sequence and the unobserved second component of vector η_t, η_{2t}, evolves as an AR(1) process:

$$\eta_{2t} = (1 - p_{11}) + \rho\eta_{2,t-1} + \xi_t \qquad (6)$$

where $\rho = p_{11} + p_{22} - 1$ and the observed unemployment series evolves following:

$$u_t = \mu_1 + \mu_2 r_t + (\sigma_1^2 + \beta r_t)^{1/2} \epsilon_t \qquad (7)$$

where $\epsilon_t \sim N(0,1)$, u_t the unemployment rate while μ_1; σ_1^2 and $(\mu_1 + \mu_2)$; $\sigma_2^2 = \sigma_1^2 + \beta$ are the expectation and volatility of the series in regime 1 and in regime 2 respectively.

3. Data

The data are quarterly and retrieved from the national statistical institute of Spain. The sample covers the period from 2002Q1 to 2020Q3 and the series are seasonally adjusted by the CensusX13 method. We perform a statistical analysis in Table 1 which represents the mean, the median, the maximum and the minimum values. The table also shows the standard deviations, the skewness and the kurtosis for testing the asymmetry as well as the Jarque-Bera statistics and its p-values between brackets for testing the normal distribution of unemployment.

Table 1. Statistical characteristics of the unemployment rate

	Mean	Median	Max	Min	StDev	skew	kurto	JarqueBera
National	16.28	16.19	26.21	7.97	5.76	0.19	1.76	5.22 (.073)
Andalucía	23.84	23.45	36.50	12.0	7.48	0.08	1.85	4.21 (.122)
Aragón	11.70	11.0	21.72	4.92	5.34	0.31	1.82	5.56 (.062)
Asturias	14.44	13.81	25.01	7.63	4.78	0.50	2.25	4.92 (.085)
Balears, Illes	14.06	12.81	24.43	6.03	5.73	0.26	1.69	6.21 (.065)
Canarias	21.51	21.36	34.51	9.80	8.27	-0.05	1.53	6.78 (.054)
Cantabria	12.50	11.60	21.98	4.96	4.30	0.30	2.20	3.13 (.209)
Castilla y León	13.65	13.13	22.24	7.00	4.34	0.38	2.07	4.45 (.108)
Castilla LaMa	17.90	18.82	30.59	7.42	7.55	0.13	1.67	5.76 (.056)
Cataluña	13.73	12.46	23.84	6.20	5.34	0.29	1.88	4.50 (.084)
Ceuta	22.77	22.79	39.29	5.67	8.17	-0.21	2.50	1.31 (.518)
C. Valenciana	17.20	16.83	28.51	7.66	6.67	0.16	1.62	6.24 (.064)
Extremadura	22.46	22.26	34.90	11.9	6.35	0.22	2.08	3.22 (.200)
Galicia	14.31	13.50	22.72	7.22	4.41	0.29	2.09	3.64 (.162)
Madrid	12.29	12.82	20.27	5.72	4.71	0.08	1.57	6.43 (.060)
Melilla	22.11	23.09	37.80	0.43	8.29	-0.68	3.18	5.85 (.054)

Murcia	17.40	17.19	29.92	6.56	7.08	0.12	1.70	5.45 (.066)
Navarra	9.99	9.98	18.64	4.52	4.10	0.37	1.98	4.95 (.084)
País Vasco	10.88	10.2	17.01	5.70	3.19	0.43	2.32	3.74 (.154)
Rioja, La	11.59	10.62	22.33	4.77	5.01	0.40	1.96	5.36 (.069)

The unemployment rate behavior shows differences revealing regional specificities of the labor market. The mean and volatility of unemployment are above their national levels in almost half of the regions. The p-values of the Jarque-Bera test indicate the normality of the residuals. The values of skewness and kurtosis are different from 0 and 3 respectively for all cases, which indicates asymmetry.

4. Results

To detect the presence of hysteresis we test for unit root with the breakpoint unit root test following Perron (1989). This approach is justified by Bleaney (2001) to avoid that structural breaks in the series falsify the outcome of the test.

Table 2. Breakpoint unit root test based on Akaike information criterion first order results

		Intercept	Intercept	Trend intercept	Trend
National	Break	2019Q4	2009Q2	2009Q2	2018Q3
	Stat (P-value)	-9.13 (< 0.01)	-9.80 (< 0.01)	-10.09 (< 0.01)	-8.84 (< 0.01)
Andalucía	Break	2009Q3	2008Q3	2008Q3	2020Q2
	Stat (P-value)	-14.27 (< 0.01)	-13.99 (< 0.01)	-14.03 (< 0.01)	-13.87 (< 0.01)
Aragón	Break	2012Q3	2013Q3	2013Q3	2009Q1
	Stat (P-value)	-6.87 (< 0.01)	-7.63 (< 0.01)	-7.73 (< 0.01)	-6.47 (< 0.01)
Asturias	Break	2013Q3	2013Q3	2013Q3	2004Q1
	Stat (P-value)	-10.52 (< 0.01)	-11.76 (< 0.01)	-11.76 (< 0.01)	-9.58 (< 0.01)
Balears	Break	2004Q4	2005Q2	2005Q2	2003Q4
	Stat (P-value)	-6.85 (< 0.01)	-6.83 (< 0.01)	-6.87 (< 0.01)	-6.79 (< 0.01)
Canarias	Break	2009Q1	2020Q1	2019Q3	2020Q2
	Stat (P-value)	-5.91 (< 0.01)	-6.09 (< 0.01)	-6.24 (< 0.01)	-6.24 (< 0.01)
Cantabria	Break	2013Q2	2013Q2	2013Q2	2019Q3
	Stat (P-value)	-9.80 (< 0.01)	-10.56 (< 0.01)	-10.49 (< 0.01)	-9.57 (< 0.01)
Castilla Leó	Break	2013Q3	2013Q3	2013Q4	2009Q1

	Stat (P-value)	-5.47 (< 0.01)	-6.42 (< 0.01)	-6.44 (< 0.01)	-5.37 (< 0.01)
Castilla Ma	Break	2004Q2	2013Q3	2013Q3	2005Q3
	Stat (P-value)	-5.46 (< 0.01)	-6.98 (< 0.01)	-6.81 (< 0.01)	-5.61 (< 0.01)
Cataluña	Break	2009Q1	2012Q4	2012Q4	2020Q1
	Stat (P-value)	-5.47 (< 0.01)	-5.78 (< 0.01)	-5.68 (<0.01)	-4.99 (<0.01)
Ceuta	Break	2012Q3	2008Q1	2008Q1	2016Q1
	Stat (P-value)	-9.81 (< 0.01)	-9.87 (< 0.01)	-9.80 (< 0.01)	-9.48 (< 0.01)
C.Valencian	Break	2005Q2	2005Q2	2009Q4	2009Q4
	Stat (P-value)	-4.73 (<0.02)	-5.01 (<0.03)	-5.76 (< 0.01)	-15.98 (< 0.01)
Extremadur	Break	2012Q2	2012Q2	2012Q2	2009Q2
	Stat (P-value)	-7.44 (< 0.01)	-8.17 (< 0.01)	-8.45 (< 0.01)	-7.11 (< 0.01)
Galicia	Break	2005Q1	2005Q1	2005Q1	2005Q3
	Stat (P-value)	-6.62 (< 0.01)	-6.97 (< 0.01)	-6.86 (< 0.01)	-5.79 (< 0.01)
Madrid	Break	2009Q1	2013Q4	2009Q1	2019Q4
	Stat (P-value)	-7.52 (< 0.01)	-7.53 (< 0.01)	-7.70 (< 0.01)	-7.13 (< 0.01)
Melilla	Break	2014Q1	2003Q4	2014Q1	2020Q3
	Stat (P-value)	-12.97 (< 0.01)	-12.84 (< 0.01)	-12.79 (< 0.01)	-11.92 (< 0.01)
Murcia	Break	2005Q1	2013Q2	2013Q2	2008Q4
	Stat (P-value)	-5.72 (< 0.01)	-7.35 (< 0.01)	-7.28 (< 0.01)	-6.45 (< 0.01)
Navarra	Break	2013Q4	2013Q3	2013Q3	2009Q2
	Stat (P-value)	-9.50 (< 0.01)	-10.45 (< 0.01)	-10.49 (< 0.01)	-9.02 (< 0.01)
País Vasco	Break	2009Q1	2013Q1	2014Q1	2009Q2
	Stat (P-value)	-6.65 (< 0.01)	-6.94 (< 0.01)	-6.89 (< 0.01)	-6.44 (< 0.01)
Rioja, La	Break	2012Q2	2012Q2	2012Q2	2009Q1
	Stat (P-value)	-10.67 (< 0.01)	-11.89 (< 0.01)	-11.85 (< 0.01)	-10.13 (< 0.01)
Critical values	1%	-4.949	-5.348	-5.719	-5.067
	5%	-4.444	-4.860	-5.176	-4.525
	10%	-4.194	-4.607	-4.894	-4.261

With p-values less than 0.01, the series are stationary in first difference, which proves the existence of hysteresis on both national and regional levels. Next we move to the estimation of the model's parameters in Table 3.

Table 3. Estimation results of the Markov Regime Switching model

		Regime 1				Regime 2			
		Coeff	Std.er	z-stat	p-val	Coeff	Std.er	z-stat	p-val
National	μ_r	0.869	0.243	3.574	.000	0.099	0.150	0.661	.509
	$log(\sigma_r)$	-0.748	0.150	-4.972	.000	-1.451	0.136	-10.67	.000
	β	0.247	0.120	3.212	.036	0.247	0.120	3.212	.036
Andalucía	μ_r	0.205	0.112	1.825	.068	0.816	0.013	65.035	.000
	$log(\sigma_r)$	-0.255	0.117	-2.178	.029	-4.824	0.598	-8.069	.000
	β	0.198	0.014	31.95	.000	0.198	0.014	31.95	.000
Aragón	μ_r	1.064	0.325	3.270	.001	0.307	0.107	2.858	.004
	$log(\sigma_r)$	-0.070	0.131	-0.537	.591	-1.159	0.193	-5.99	.000
	β	0.314	0.148	2.106	.311	0.314	0.148	2.106	.311
Asturias	μ_r	2.332	0.801	2.911	.004	0.710	0.635	1.117	.264
	$log(\sigma_r)$	-0.192	0.313	-0.612	.540	0.031	0.109	0.280	.779
	β	0.463	0.114	4.016	.003	0.463	0.114	4.016	.003
Balears,	μ_r	2.271	0.671	3.383	.001	0.483	0.392	1.233	.217
	$log(\sigma_r)$	0.428	0.159	2.689	.007	-0.212	0.120	-1.769	.077
	β	0.311	0.142	2.688	.107	0.311	0.142	2.688	.107
Canarias	μ_r	0.618	0.152	4.074	.000	-0.464	0.011	-4.405	.000
	$log(\sigma_r)$	0.144	0.084	1.711	.087	-4.689	0.683	-6.870	.000
	β	0,327	0,003	8.213	.000	0,327	0,003	8.213	.000
Cantabria	μ_r	-0.110	0.474	-0.232	.817	1.453	0.491	2.961	.003
	$log(\sigma_r)$	0.053	0.130	0.410	.682	-0.309	0.186	-1.663	.096
	β	0.193	0.134	1.549	.099	0.193	0.134	1.549	.099
Castilla y León	μ_r	1.398	0.218	6.407	.000	0.331	0.194	1.702	.089
	$log(\sigma_r)$	-0.711	0.111	-6.404	.000	-0.800	0.081	-9.892	.000
	β	0.951	0.014	69.67	.000	0.951	0.014	69.67	.000
Castilla – La	μ_r	0.517	0.119	4.357	.000	-0.151	0.019	-7.847	.000
	$log(\sigma_r)$	-0.073	0.089	-0.814	.415	-0.151	0.019	-7.847	.000

Mancha	β	0.327	0.004	245.4	.000	0.327	0.004	245.4	.000
Cataluña	μ_r	0.280	0.013	21.01	.000	0.652	0.108	6.057	.000
	$log(\sigma_r)$	-4.067	0.222	-18.33	.000	-0.222	0.094	-2.364	.018
	β	0.240	0.006	103.8	.000	0.240	0.006	103.8	.000
Ceuta	μ_r	0.704	0.024	29.58	.000	2.648	0.367	7.219	.000
	$log(\sigma_r)$	-3.976	0.951	-4.179	.000	1.107	0.085	13.06	.000
	β	0.450	0.004	109.7	.000	0.450	0.004	109.7	.000
Valenciana	μ_r	1.577	0.763	2.065	.039	0.187	0.241	0.775	.438
	$log(\sigma_r)$	-0.271	0.477	-0.569	.570	-0.745	0.118	-6.307	.000
	β	0.196	0.192	0.596	.244	0.196	0.192	0.596	.244
Extremadura	μ_r	-0.864	0.575	-1.503	.132	0.998	0.446	2.238	.025
	$log(\sigma_r)$	-0.395	0.335	-1.177	.239	-0.113	0.157	-0.721	.471
	β	0.195	0.179	1.516	.256	0.195	0.179	1.5156	.256
Galicia	μ_r	0.657	0.221	2.976	.003	0.027	0.682	0.039	.969
	$log(\sigma_r)$	-0.732	0.095	-7.682	.000	0.327	0.326	1.003	.316
	β	0.192	0.151	1.342	.360	0.192	0.151	1.342	.360
Madrid	μ_r	0.390	0.200	1.946	.052	1.459	0.301	4.844	.000
	$log(\sigma_r)$	-0.693	0.118	-5.867	.000	-0.272	0.145	-1.878	.060
	β	0.944	0.017	55.93	.000	0.944	0.017	55.93	.000
Melilla	μ_r	4.134	1.525	2.710	.007	2.271	1.071	2.120	.034
	$log(\sigma_r)$	1.533	0.198	7.762	.000	0.532	0.253	2.101	.036
	β	0.221	0.095	2.208	.118	0.221	0.095	2.208	.118
Murcia	μ_r	-0.220	0.167	-1.311	.190	0.861	0.234	3.682	.000
	$log(\sigma_r)$	-1.788	0.337	-5.307	.000	-0.145	0.095	-1.529	.126
	β	0.241	0.137	1.925	.237	0.241	0.137	1.925	.237
Navarra	μ_r	0.362	0.236	1.533	.125	0.976	0.485	2.011	.044
	$log(\sigma_r)$	-0.980	0.258	-3.793	.000	0.005	0.109	0.043	.966
	β	0.462	0.137	3,.223	.475	0.462	0.137	3,.223	.475
País	μ_r	2.125	0.423	5.021	.000	0.927	0.307	3.020	.003
Vasco	$log(\sigma_r)$	-0.578	0.174	-3.327	.001	-0.610	0.124	-4.929	.000

	β	0.880	0.030	29.14	.000	0.880	0.030	29.14	.000
Rioja, La	μ_r	0.294	0.398	0.738	.461	1.708	0.470	3.631	.000
	$log(\sigma_r)$	0.163	0.167	0.971	.331	-0.550	0.321	-1.713	.087
	β	0.958	0.030	32.15	.000	0.958	0.030	32.15	.000

According to the results of Table 3, the corresponding significance levels are 5% or less, except for Extremadura and Galicia. The volatility in the second regime for the national unemployment is lower than in the first regime, the same is observed in almost half regions. Next we move to the estimation of the regime transition probabilities and the expected durations in table 4. p_{12} is the probability to move from the first to the second regime during the next quarter, while p_{21} is the probability to move from the second to the first regime during the next quarter.

Table 4. Estimation of the regime transition probabilities and the expected durations

	Regime transition probabilities				Expected durations	
	p_{11}	p_{12}	p_{21}	p_{22}	Regime 1	Regime 2
National	0.79	0.21	0.06	0.94	4.713	16.152
Andalucía	0.83	0.18	0.99	0.01	5.705	5.705
Aragón	0.95	0.05	0.07	0.93	18.934	13.288
Asturias	0.93	0.07	0.02	0.98	14.024	48.970
Balears, Illes	0.93	0.07	0.04	0.96	15.254	24.132
Canarias	0.81	0.19	0.98	0.02	5.171	1.019
Cantabria	0.95	0.05	0.07	0.93	20.666	15.115
Castilla y León	0.94	0.06	0.04	0.96	16.525	26.660
Castilla - La Mancha	0.85	0.15	0.99	0.01	6.912	1.002
Cataluña	0.41	0.59	0.14	0.86	1.682	6.960
Ceuta	0.19	0.81	0.05	0.95	1.240	18.328
Comunitat Valenciana	0.73	0.27	0.06	0.94	3.714	15.529
Extremadura	0.74	0.26	0.23	0.77	1.246	4.297
Galicia	0.98	0.02	0.24	0.76	47.057	4.102
Madrid	0.95	0.05	0.08	0.92	20.157	12.445
Melilla	0.01	0.99	0.61	0.39	1.001	1.649
Murcia	0.58	0.42	0.10	0.90	2.386	10.323

Navarra	0.92	0.08	0.02	0.98	12.784	47.872
País Vasco	0.88	0.12	0.06	0.94	8.470	17.412
Rioja, La	0.95	0.05	0.22	0.78	19.175	4.550

According to Table 4 the probabilities of transition from the first to the second regime is greater on the national level 21% vs 6%. The same pattern is observed in twelve among the nineteen regions. Also on the national level the duration of the second regime is higher than the first regime16.152 vs 4.713 the same is observed in all switching regions except for Navarra. The volatility of the second regime, as showed in Table 3, for the switching unemployment rate is lower except for Melilla region. Despite the success of the labor market reforms of 2010 and 2012 in promoting employment by adding more flexibility to the collective bargaining system in Spain, unemployment behavior differ on a regional scale. Our results are in line with the claims of Clark and Summers (1982); Ellwood (1982) and Blanchard and Summers (1986), labor market frictions alone cannot explain persistent high unemployment rates when the series display non-linearity. Also our findings are in line with previous works confirming that regional unemployment disparities in Spain are mainly driven by regional equilibrium factors (López-Bazo et al, 2005; Bande et al, 2008; Villaverde and Maza, 2009).

5. Concluding Remarks

In this paper we analyzed the behavior of unemployment in Spain on the national and regional levels using a Markov Regime Switching model on quarterly data over the period 2002Q1 to 2020Q3. We found evidence of asymmetry and hysteresis on the national and regional levels. We also found similarity between unemployment’s behavior on the national level and only in half regions, as he switches from the first to the second regime associated with higher duration and lower volatility. Our results confirm previous works which links regional unemployment to regional equilibriums. The policy implications we derive from our results are the inevitability of more structural reforms to boost the demand and improve the workforce’s qualifications in certain regions and even reduce the institutional differences in legislations and union power between regions in order to increase labor and firm mobility between regions and the performance of future labor market reforms.

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