Universidad Pablo de Olavide (España)
Revista de Métodos Cuantitativos para la Economía y la Empresa
número 39, 2025
ISSN: 1886-516X
DOI: 10.46661/rev.metodoscuant.econ.empresa.10840
Sección: Artículos
Recibido: 17-07-2024
Aceptado: 24-10-2024
Publicado: 26-06-2025
Páginas: 1-13

Revista de Métodos Cuantitativos para la Economía y la Empresa

Sensibilidad del desempleo por género al ciclo económico en las provincias españolas

Gender-Specific Unemployment Sensitivity to the Economic Cycle at the Provincial Level in Spain

Aida Galiano
Universidad Internacional de La Rioja (España)
https://orcid.org/0000-0002-1587-6262
aida.galiano@unir.net

Alejandro Almeida
Universidad de Extremadura (España)
https://orcid.org/0000-0001-6490-4998
alejandroalmeida@unex.es

Juan Manuel Martín-Álvarez
Universidad Internacional de La Rioja (España)
https://orcid.org/0000-0002-7315-9827
juanmanuel.martin@unir.net

Lara Mata
Universidad Internacional de La Rioja (España)
https://orcid.org/0000-0003-0283-8643
lara.mata@unir.net

RESUMEN

Este estudio ofrece nuevas perspectivas sobre cómo responden las diferentes regiones de España a los cambios en el ciclo económico, proporcionando un enfoque novedoso mediante el uso de datos trimestrales desagregados a nivel provincial y por género. Nuestro objetivo es identificar qué regiones se ven más afectadas por las fluctuaciones económicas, diferenciando los efectos entre hombres y mujeres. Nuestra investigación resalta la importancia de considerar tanto factores regionales como específicos de género al diseñar políticas laborales que busquen mitigar los efectos de los ciclos económicos.

Los datos empleados provienen de la Encuesta de Población Activa (EPA) de España y consideran las tasas de desempleo regionales trimestrales a nivel provincial desde 2002 hasta 2023. Estimamos un modelo de datos de panel dinámico que incorpora todos los componentes de las disparidades en las tasas de desempleo regionales,

Cómo citar: Galiano, A., Almeida, A., Martín-Álvarez, J. M., & Mata, L. (2025). Sensibilidad del desempleo por género al ciclo económico en las provincias españolas. Revista De Métodos Cuantitativos Para La Economía Y La Empresa, (39), 1–13. https://doi.org/10.46661/rev.metodoscuant.econ.empresa.10840

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

siguiendo el enfoque del modelo de panel dinámico de Vega y Elhorst.

Nuestros hallazgos muestran que hombres y mujeres experimentan distintos niveles de sensibilidad a los cambios económicos, variando según la provincia sin un patrón geográfico definido. Esto confirma que las tasas de desempleo por género se ven afectadas de manera diferenciada por los ciclos económicos y que dichas diferencias dependen de factores geográficos y regionales, en línea con la literatura previa. Arrojamos luz sobre la compleja dinámica del mercado laboral dentro de cada región, subrayando la necesidad de recalibrar las políticas en función de la sensibilidad cíclica específica de cada género y región.

Nuestros resultados abogan por la continuidad en la implementación de políticas laborales con perspectiva de género, al mismo tiempo que enfatizan la importancia de personalizar las políticas a nivel provincial. Así, nuestra investigación subraya la necesidad de seguir desarrollando análisis regionales que permitan diseñar políticas efectivas para ayudar a los distintos grupos poblacionales a mitigar las consecuencias de las fluctuaciones económicas.

PALABRAS CLAVE

Sensibilidad cíclica; Género; Desempleo regional; Dependencia espacial; Factores comunes.

ABSTRACT

This study offers new insights into how different regions in Spain respond to changes in the economic cycle, providing a fresh perspective using quarterly data desegregated by provincial level and gender. We aim to identify which regions are affected the most by the economic fluctuations, disentangling the differences between men and women. Our research highlights the importance of considering both regional and gender-specific factors when creating labor policies that aim to mitigate the effects of economic cycles. The data we use comes from the Spanish Active Population Survey (EPA) and consider quarterly regional unemployment rates by provinces from 2002 to 2023. We estimate a dynamic panel data model that considers all components of the disparities in regional unemployment rates following the Vega and Elhorst's dynamic panel data model. Our findings show that men and women experience different levels of sensitivity to economic changes, which vary depending on the province without a definite geographical pattern. This confirms that gender unemployment rates are affected differently by economic cycles and demonstrates that these differences depend on geographical and regional factors, which is in line with previous literature. We shed light on the complex dynamics of the labor market within each region, highlighting the need to recalibrate policies based on the specific gender and regional cyclical sensitivity. Our findings advocate for the continued adoption of gender labor policies while also stressing the importance of customizing policies at the provincial level. Thus, our research underscores the need to continue developing regional analysis to perform policies that help population groups effectively switch off the consequences of economic fluctuations.

KEYWORDS

Cyclical sensitivity; Gender; Regional unemployment; Spatial dependence; Common factors.

Clasificación JEL: C21, E24, E32, R23, J16.

MSC2010: 91B82, 91B84, 62P20, 91B50, 62M10

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

1. INTRODUCTION

Across the economic cycles, the labor market is the main sign of forthcoming economic events – Negative phases have historically displayed high unemployment levels (Elsby et al., 2013). Due to this cyclical sensitivity of the unemployment rates, literature on the economic cycle uses the GDP and unemployment rates as the key variables to measure the economic cycle (Martín-Álvarez et al., 2020). However, fluctuation in the national unemployment rate affects regions differently, which has driven literature to analyze them regarding regional cyclical sensitivity. Thus, the literature on regional sensitivity to the economic cycle dates to the '60s and links the regional unemployment rate to the national one and measures how sensitive regions are to changes in the national economic context (Thirlwall, 1966; Bechling, 1967; Forrest et al., 1988; Jimeno and Bentolila, 1998).

Unemployment rates are strikingly high in the Spanish labor market, particularly during recessions. Spain currently has an unemployment rate of 12.9%, with Greece being the only other country in the European Union to have a double-digit unemployment rate (Eurostat annual data, 2022). This rate is especially high when it is compared to the rate of the European Union – 27 countries (from 2020) or, in the case of the European Union – 20 countries (from 2023), 6% and 6.5%, respectively. Many researchers have analyzed the driving factors that determine these differences between countries. Some papers examine the influence of inflow and outflow as the highest contributors to unemployment variation within countries (Elsby et al., 2013). Productivity differences are also considered an important factor in explaining cross-country unemployment patterns (Yin Fen and Rauch, 2024).

Literature has also examined differences in regional unemployment rates within countries (Lolos and Papapetrou, 2012). In Spain, unemployment rates behave differently inside the country, resulting in significant and persistent disparities between regions. This issue has become increasingly relevant due to high unemployment rates (Gadea et al., 2012; Cuellar-Martin et al., 2018), which were exacerbated after the Spanish Great Recession (Gadea et al., 2006; Camacho et al., 2018), with the unemployment rate reaching a maximum of up to 27% (Sala and Trivín, 2014; Albulescu and Tiwari, 2018), and these differences have been observed to be persistent over time (Jimeno and Bentolila, 1998; López-Bazo et al., 2002; Bande et al., 2008; Azorín, 2013). Many studies have been conducted to understand the mechanisms and performance of regional disparities (Forrest and Naisbitt, 1987; Bande and Karanassou, 2009, 2019; López-Bazo and Motellón, 2013).

Otherwise, several authors have studied the relationship between regional unemployment and the economic cycle in the Spanish labor market over the last two decades (Villaverde and Maza, 2009; Martín-Alvarez et al., 2020). These studies have demonstrated that the sensitivity to the economic cycle of unemployment is not solely dependent on whether regions have high or low unemployment rates but also on their geographical location. It seems that geographical location plays an important role, revealing the existence of spatial dependence patterns among Spanish regions. For example, Pérez et al. (2003) found a lower unemployment variability to the business cycle in Andalucía, while Amarelo (2013) found the opposite for Cataluña. Almeida et al. (2020) showed that the regions in the Mediterranean arc are more sensitive to the economic cycle, reacting more quickly to changes in the economy. They also provide the existence of spatial dependence patterns between regions at the Autonomous Community level. Additionally, Cuéllar-Martín et al. (2018) analyzed this feature at the provincial level. These findings confirm that geographical location is a relevant factor in analyzing the cycle sensitivity, meaning that geographical and location factors matter in the unemployment trend.

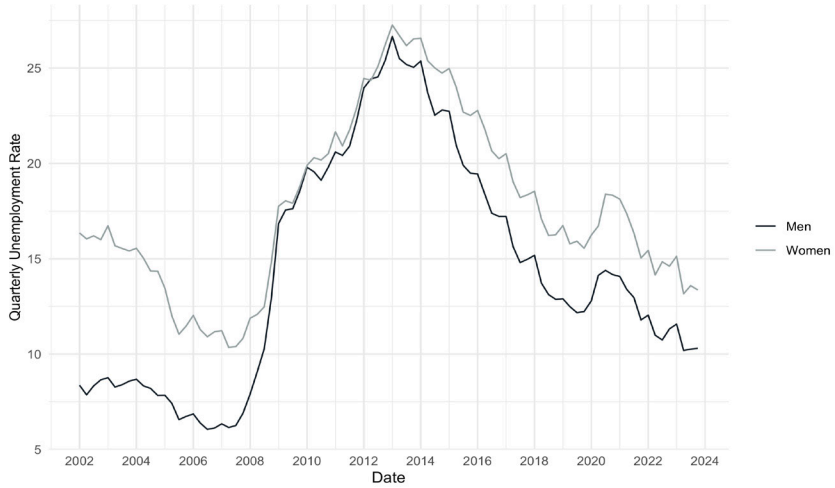
Furthermore, there exists a large degree of heterogeneity in the cyclical sensitivities of unemployment across workers and economic groups (Forsythe and Wu, 2021; An et al., 2022). Concretely, unemployment fluctuations exhibit differences by gender. The literature on gender differences in labor market dynamics reveals that female employment is generally more stable over time and less sensitive to economic cycles. An et al. (2022) realize the unequal impacts of the business cycle across economic groups; concretely, women are significantly less sensitive to demand. Especially in Mediterranean countries like Spain, where the rate of unemployment among women is significantly higher than that of men (Azmat et al., 2006). In advanced economies, women's unemployment is less affected by business cycles compared to that of men (Gomes,

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

2024). During economic downturns, men are especially hit (Bachmann et al., 2015), and women tend to experience fewer job losses (Şahin et al., 2009; Albanesi and Şahin, 2018), showing a countercyclical response, especially in the case of less-educated women (Theodossiou and Zangelidis, 2009). This circumstance reduces the gender gap during recessions. Evidence from the United States and the United Kingdom reveals that the countercyclical flow rate from inactivity to employment was also more significant for women, especially in the US, where it accounted for approximately all the fall in employment, compared with only 40 % for men (Razzu and Singleton, 2016). De la Rica and Rebollo-Sanz (2017) concluded that these gender differences could be explained by the fact that women tend to work in noncyclical sectors. Additionally, Albanesi and Şahin (2018) attribute these differences to the regin, while Petrongolo and Ronchi (2020) suggest that the geographic location of jobs also plays a role.

In the Spanish labor market, gender differentials in labor market outcomes are procyclical (Nagore-García, 2017). The empirical evidence and the literature on unemployment gender disparities (Dolado et al., 2013; De la Rica and Rebollo-Sanz, 2017) confirm the existence of a persistent gender gap over time that is reduced in downturn stages. Figure 1 shows that during the Great Recession, the unemployment rate for men grew faster than for women, resulting in a reduction of the gender gap (from a gap of 4.99 points in 2006 to -0.07 points in 2012).

Figure 1. Quarterly Unemployment Rates by gender. Spanish labor market. 2002 to 2023.



The focus of our paper is to analyze gender differences in the sensitive to the economic cycle using a regional approach by Spanish provinces. This is important because previous research has shown that regional sensitivity plays a crucial role in such analyses, and literature on gender differences has pointed out the unequal impacts of the business cycle on women. Additionally, studies on gender labor market dynamic indicate that the industry, sector, and geographic location of jobs have a significant impact on how male and female unemployment rates differ (Albanesi and Şahin, 2018; De la Rica and Rebollo-Sanz, 2017; Petrongolo and Ronchi, 2020). Therefore, our goal is to examine gender sensitivity to the cycle from a regional perspective for the case of the Spanish labor market, which, as far as we know, has still not been analyzed by the applied literature.

Our study provides a provincial perspective over an expanded temporal sample from 2002 to 2023, considering quarterly data. The use of quarterly data instead of annual data makes the results more robust and allows us to capture seasonal variations. Additionally, we introduce in our analysis a gender perspective so we can determine whether men and women have different sensitivities to the national economic cycle by region.

In our study, we have used Vega and Elhorst's (2016) dynamic panel data model to provide a clear understanding of how different regions and genders are affected by the national economic

cycle. By using this method, consider all components of the stylized fact that defines the disparities in regional unemployment rates: common component, spatial dependence and serial dynamic, contrary to the common dynamic panel data models, which only account for spatial dependence. Following this methodology, we estimate two sensitivity parameters, one for men and the other for women, to determine their respective sensitivity to economic fluctuations. Therefore, our analysis adds a gender perspective to previous related literature on regional sensitivity.

2. MATERIAL AND METHODS

Quarterly regional unemployment rates are obtained from the Spanish Active Population Survey (EPA) conducted by the Spanish Statistical Institute (INE). Regions are considered as the 48 provinces that conform the Spanish State (excluding the Islands and the Autonomous Communities of the cities of Ceuta and Melilla). The Spanish autonomous communities include several provinces (48 provinces and the Islands, Baleares y Canarias, Ceuta, and Melilla). The number of provinces in each autonomous community varies from one community to another. Figure 2 indicate the name and location of each province.

Figure 2. Name and location of the Spanish provinces.

The national unemployment rate is also considered from the same survey to be treated as a common factor in the model, following Bailey et al. (2016). The study covers from the first quarter of 2002 to the last quarterly data available at the time of carrying out the study (fourth quarter of 2023). So, we are considering 4,224 observations in the panel (88 temporal units and 48 spatial units). This length of the panel gives robustness to our results since we have a sufficiently large sample at the temporal and spatial levels. Also, using quarterly data we are properly capturing the sensitivity of the seasonal variation of the data.

The model used in this study is based on the framework proposed by Vega and Elhorst (2016). This model incorporates temporal, spatial, and spatiotemporal dynamics and accounts for common factors. Unlike other dynamic panel data models that only consider spatial dependence, our model considers all components of the stylized fact, including common components and serial dynamics. It has been widely applied in various domains, primarily in analyzing macroeconomic variables.

The model encompasses several dynamics present in the data. Firstly, it introduces spatial dependence by distinguishing between two types of spatial dependence. On the one hand, there is weak spatial dependence, which pertains to the relationship with neighboring regions and

allows for considering potential geographic or regional determinants and spillovers. On the other hand, strong spatial dependence measures the relationship between all regions within a higher-level geographic unit (in our case study, the relationship among all regions as they are part of the same country, Spain).

Furthermore, as panel data is available, this model considers temporal dynamics and potential spatial interactions occurring with a certain lag. In other words, the model incorporates spatial and spatio-temporal unemployment trends.

The specification of the model is as follows:

$$U_t = \tau U_{t-1} + \delta WU + \eta WU_{t-1} + \Gamma_1 Un_t + \Gamma_2 Un_{t-1} + \mu + \epsilon_t$$

where U_t is a column vector with one observation of the dependent variable (women or men unemployment) at every point (t). U_{t-1}, WU, and WU_{t-1} are temporal, spatial, and spatio-temporal lag vectors, respectively, with τ, δ, and η autoregressive coefficients. W is the *nxn* matrix describing the arrangement of the regions in the space. Our work uses the standardized binary contiguity matrix since it is the standard matrix used in empirical works. However, we also estimate the model using other weight matrices, producing similar results. U_{n_t} and $U_{n_{t-1}}$ are the levels of national unemployment at time t and $t - 1$. Here, we employ the national unemployment rate yearly (without distinguishing between men and women). This approach allows us to calculate the sensitivity of both male and female unemployment to changes in the national trend as a measure of the economic cycle. T_1 and T_2 are *Nx*1 column vectors with unit-specified coefficients of response to the common factors. μ represents the spatial fixed effect added to the model, and ϵ_t is the *Nx*1 vector independently and identically distributed error term with zero mean and constant variance.

As part of our estimation process, we conduct two validation tests for each model. The first is the local CD-test, developed by Moscone and Tosseti (2009), which evaluates the presence of weak spatial dependence or interactions between neighboring regions. The second is the alpha test, introduced by Bailey et al. (2016), which examines the existence of strong spatial dependence or common factors. These tests help us ensure the accuracy and reliability of our models.

3. RESULTS

In this section, we adhere to the econometric strategy described, presenting the estimation achieve to reveal a novel perspective on men and women's different sensitivities to the economic cycle at the provincial level in the Spanish labor market. The regions we focus on are the 48 provinces that conform to the Spanish State (excluding the Islands and the Autonomous Communities of the cities of Ceuta and Melilla), ensuring a deeper geographical analysis as developed in previous studies.

In Table 1, we present female and male parameters of the dynamic spatial panel data estimation with regional fixed effects. The significance of the estimated parameters is strikingly similar for both genders, underscoring the importance of our findings. We observe the existence of temporal persistence in unemployment rates, a key insight into the economic cycle. Spatial dependence (weak) does not appear to be significant within the same period when common factors are included. However, space-time dependence is substantial for men and women, suggesting that the influence (spillovers) between neighboring regions is not instantaneous; on the contrary, it takes time to occur. The outcomes of the tests (CD-local and alpha test), which are also presented in Table 1, both indicate the absence of spatial dependence among neighbors or common factors in the errors, further reinforcing the robustness of our results.

Table 1. Dynamic spatial panel data models with regional fixed effects.

	Male	Female
T	0.500 (0.000)	0.511 (0.000)
δ	0.151 (0.000)	0.095 (0.000)
η	0.078 (0.006)	0.137 (0.000)
Regional fixed effect	Yes	Yes
Common factors	Yes	Yes
R2	0.956	0.926
Corr R2	0.937	0.839
Log-Likelihood	−7660.194	−8934.522
CD local	−0.498	−0.091
alpha test	0.141	0.270

P-values are reported in parentheses.

Once we have verified the accurate specification of our model, we present the result of parameters for each region and gender (Table 2). These parameters, calculated from T_1 and T_2 coefficients, are highly significant for all areas and genders (standard errors are reported in the table). Of particular importance is the Y_2 parameter, introduced in the table, which measures the spatio-temporal dynamic of the economic cycle. We focus on the Y_2 parameter to comment on the results, as it provides a key measure of the economic cycle's spatio-temporal dynamic. This parameter, as explained by Vega and Elhorst (2016), requires a transformation to be obtained.

We can observe (Table 2) that all parameters are significant, and the magnitudes of the parameters vary from negative to positive regarding the level of sensitivity presented by each gender and province. If the parameters are greater than one, it means that they represent regions sensitive to fluctuations but that they go contrary to the national trend. If they are less than one and significant, they represent regions with less sensitivity to the economic cycle but also against the national trend. The last column presents the difference between male and female parameters to corroborate if such differences are significant, as well as the signs of them (positive means that the region considered is more sensitive for men than for women).

Table 2. Common factors by gender.

	Male		Female	
	$\gamma_2 = \frac{\Gamma_2}{(-\mathrm{T}-\eta)}$	Std. err.	$\gamma_2 = \frac{\Gamma_2}{(-\mathrm{T}-\eta)}$	Std. err.
Álava	0.331	0.190	0.577	0.272
Albacete	1.156	0.190	1.591	0.272
Alicante	1.608	0.189	1.511	0.272

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

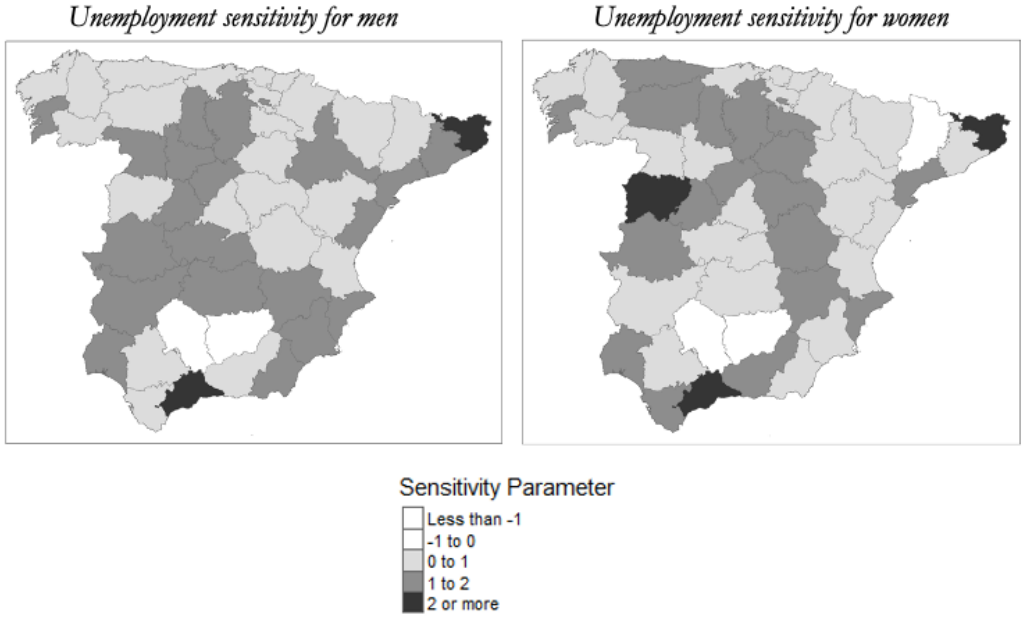
	Male		Female	
Almería	1.191	0.189	0.117	0.273
Asturias	0.507	0.192	1.494	0.273
Ávila	1.431	0.191	1.790	0.273
Badajoz	1.423	0.191	0.913	0.273
Barcelona	1.234	0.190	0.962	0.272
Burgos	1.088	0.190	1.236	0.272
Cáceres	1.150	0.192	1.994	0.274
Cádiz	0.668	0.191	1.013	0.273
Cantabria	0.957	0.191	0.898	0.272
Castellón	1.831	0.190	0.826	0.272
Ciudad Real	1.260	0.192	0.526	0.273
Córdoba	−0.879	0.191	−1.32	0.272
Cuenca	0.492	0.191	1.902	0.273
Girona	2.531	0.189	2.089	0.271
Granada	0.258	0.189	1.261	0.271
Guadalajara	0.776	0.190	1.008	0.272
Guipúzcoa	0.411	0.190	0.425	0.272
Huelva	1.385	0.193	1.525	0.275
Huesca	0.842	0.189	0.489	0.272
Jaén	−1.487	0.191	−1.973	0.272
La Coruña	0.647	0.193	0.617	0.273
La Rioja	0.601	0.190	1.597	0.272
León	0.829	0.192	1.222	0.273
Lleida	0.639	0.190	−0.007	0.272
Lugo	0.942	0.193	0.583	0.273
Madrid	0.763	0.191	0.770	0.273
Málaga	2.726	0.190	2.301	0.272
Murcia	1.521	0.189	0.890	0.272
Navarra	0.900	0.189	0.751	0.272
Orense	0.334	0.194	0.565	0.273

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

	Male		Female	
Palencia	1.876	0.191	1.101	0.272
Pontevedra	1.075	0.194	1.278	0.273
Salamanca	0.809	0.192	2.423	0.273
Segovia	1.52	0.190	1.307	0.272
Sevilla	0.275	0.190	0.101	0.272
Soria	0.925	0.190	1.783	0.272
Tarragona	1.237	0.190	1.774	0.272
Teruel	0.928	0.190	0.247	0.273
Toledo	1.288	0.192	0.709	0.275
Valencia	0.508	0.190	0.439	0.273
Valladolid	1.297	0.191	0.450	0.272
Vizcaya	0.14	0.190	0.810	0.272
Zamora	1.563	0.193	0.365	0.273
Zaragoza	1.738	0.190	0.774	0.272

To simplify the lecture of the results presented in Table 2, we illustrate them in Figure 3, where the coefficients are represented in two maps for each gender. In the maps, the darker the area are the greater is the sensitivity for that group in such region.

Figure 3. Sensitivity to economic cycle by province and gender.



The dark area means a greater sensitivity for that group.

Our analysis uncovers significant patterns. While some regions demonstrate similar sensitivity for both genders (exactly 28 provinces exhibit similar sensitivity), others reveal notable gender disparities in sensitivity parameters. There are ten provinces where men are significantly more sensitive than women (Zaragoza, Castellón, Lérida, Barcelona, Toledo, Zamora, Valladolid, Ciudad Real, Almeria and Murcia) and nine regions where women show higher sensitivity (Cádiz, León, Asturias, Cuenca, Granada, Salamanca, La Rioja, Soria, and Guadalajara). Malaga and Girona present the highest sensitivity values for both men and women, and Cordoba and Jaen have the lowest sensitivity values. The sensitivity parameter is also very low in Lleida and very high in Salamanca, for women but not for men.

While there are discernible variations at the provincial level, which underscore the differing ways in which men and women experience national economic cycles across regions, it is not feasible to discern a geographical pattern as was the case in previous literature (Camacho et al., 2018; Almeida et al., 2020), where the national trend was most pronounced in the Mediterranean arc. Nevertheless, our results uncertainly revel disparities between provinces and genders. These results highlight that disaggregation in Autonomous Communities is not enough to expose regional labor market nuances.

So, this research reveals a crucial point: the sensitivity of men and women to the national economic cycle are not uniform across Spain. This non-uniformity implies that the economic cycle impact differently across regions, particularly across provinces, reflecting their unique sensitivities which is also specific by gender. These disparities underscore the necessity of gender labor policies that consider these differences in the sensitivity to the cycle, as well as the importance of region-specific policies to mitigate the effects of economic cycles on gender unemployment.

4. CONCLUSIONS

This paper presents a novel approach to the literature on regional sensitivity analysis to the economic cycle, adding a new dimension to the existing body of knowledge. By providing a gender perspective, we can distinguish regions where male and female unemployment are equally sensitive from those where gender differences are prevalent. Therefore, our findings emphasize the value of conducting regional analyses to develop effective gender labor policies.

We found significant patterns in gender sensitivity parameters across different regions. While some regions exhibit similar sensitivity levels for both genders, other regions show notable gender disparities in sensitivity parameters. Specifically, there are ten provinces where men are significantly more sensitive than women, namely Zaragoza, Castellón, Lérida, Barcelona, Toledo, Zamora, Valladolid, Ciudad Real, Almeria, and Murcia. Conversely, nine regions exhibit higher sensitivity levels in women compared to men (Cádiz, León, Asturias, Cuenca, Granada, Salamanca, La Rioja, Soria, and Guadalajara). Both men and women exhibit the highest sensitivity values in Malaga and Girona, while for Cordoba and Jaen they both show the lowest sensitivity values. The sensitivity parameter is also very low for Lleida and very high in Salamanca in the case of women. For men, Girona and Malaga show the highest values of the parameters, although these parameters are also high in the case of women.

The spatial location of the differences in sensitivity by gender does not show a very defined pattern as occurred in previous literature (Camacho et al., 2018; Almeida et al., 2020) where a geographical pattern show that the national trend was most pronounced in the Mediterranean arc. Nevertheless, disparities do exist between provinces and genders. These disparities in regional cycle sensitivity for men and women should serve as a wake-up call for authorities, highlighting the ongoing need to adopt gender policies in the labor market but attending by the unique needs of each group in each territory. We prove the need to carry out regional analysis and to continue implementing gender-specific labor policies at the regional level to reduce the impact of economic cycles on regions.

Consequently, our findings alert authorities to the need to proceed at the provincial level in the design of gender labor policies, considering the sensitivity shown in each region at the provincial level to perform effective policies to switch off the effect of the economic cycle. This fact reinforces the usefulness of regional analyses when performing gender labor policies to mitigate the effect of the economic cycle since our results unequivocally identify regional and gender factors as key determinants of cyclical sensitivity in regional unemployment rates. Disregarding the regional and gender aspect in policy design would be a misstep; instead, policies must be tailored to the cyclical sensitivity exhibited by each region and gender. Our findings advocate not only for the continued adoption of gender policies in the labor market but also for the customization of policies at the provincial level to mitigate the consequences of economic cycles effectively. Therein lies the need to continue developing empirical studies at the regional level.

This study opens lines for future research. Our research has demonstrated that location alone is not a significant factor, suggesting that future studies could explore other potential factors that contribute to the cyclical sensitivity of unemployment rates. Further research should focus on an in-depth exploration of the labor market characteristics that result in gender-specific differences across various provinces. By investigating these differences, it can be gained a more nuanced understanding of the underlying factors that contribute to these disparities. Additionally, examining the local economic, social, and cultural contexts that influence labor market outcomes will be crucial. Such detailed analysis will not only enhance our knowledge of regional labor market dynamics but also provide a robust foundation for developing targeted economic policies. These policies could address gender disparities more effectively, promoting a more equitable labor market across different regions.

COMPLIANCE WITH ETHICAL STANDARDS

This study has not received any funding.

We have no conflicts of interest to disclose.

The data used in this research is under public access at INE www.ine.es

This article does not contain any studies with human participants or animals performed by any of the authors.

REFERENCES

Albanesi, S., Şahin, A. (2018) The gender unemployment gap. *Review of Economic Dynamics*, *30*:47-67. https://dx.doi.org/10.1016/j.red.2017.12.005

Albulescu, C.T., Tiwari, A.K. (2018) Unemployment persistence in EU countries: new evidence using bounded unit root tests, *Applied Economics Letters*, *25*(12):807-810. https://doi.org/10.1080/13504851.2017.1368979

Almeida, A., Galiano, A., Golpe, A.A., Martín-Alvarez, J.M. (2020) Regional unemployment and cyclical sensitivity in Spain. *Letters in Spatial and Resource Sciences*, *13*:187–199. https://doi.org/10.1007/s12076-020-00252-3

Amarelo, C. (2009) La relació entre el creixement econòmic i la taxa d'atur en el cas català. *Nota d'Economia*, *93-94*:275-277. ISSN-e 2013-8709 Available at: https://economia.gencat.cat/web/.content/documents/articles/arxius/larelacioentreelcreixementeconomicilataxad_aturenelcascatala.pdf

An, Z., Bluedorn, J., Ciminelli, G. (2022). Okun's Law, development, and demographics: differences in the cyclical sensitivities of unemployment across economy and worker groups. *Applied Economics*, *54*(36):4227–4239. https://doi.org/10.1080/00036846.2022.2027333

Azmat, G., Güell, M., Manning, A. (2006) Gender Gaps in Unemployment Rates in OECD Countries. *Journal of Labor Economics*, *24*(1):1–37. https://doi.org/10.1086/497817

Azorín, J.D.B. (2013). La distribución del desempleo en las provincias españolas: Un análisis con datos de panel mediante el filtrado espacial. *Investigaciones Regionales: Journal of Regional Research*, *27*:143–154. http://hdl.handle.net/10017/26964

Bachmann, R., Bechara, P., Kramer, A. et al. (2015) Labour market dynamics and worker heterogeneity during the Great Recession – Evidence from Europe. *IZA Journal of Labor Studies*, *4*(19)_ 1-29. https://doi.org/10.1186/s40174-015-0043-0

Bailey, N., Kapetanios, G., Pesaran, M.H. (2016) Exponent of cross-sectional dependence: Estimation and inference. *Journal of Applied Econometrics*, *31*(6):929-960. https://doi.org/10.1002/jae.2476

Bande, R., Fernández, M., Montuenga, V. (2008) Regional unemployment in Spain: Disparities, business cycle and wage setting. *Labour Economics*, *15*(5):885-914. https://doi.org/10.1016/j.labeco.2007.07.009

Bande, R., Karanassou, M. (2009) Labour market flexibility and regional unemployment rate dynamics: Spain 1980–1995. *Papers in Regional Science*, *88*(1):181–207. https://doi.org/10.1111/j.1435-5957.2008.00165.x

Bande, R., Karanassou, M., Sala, H. (2019). Employment in Spanish regions: cost-control or growth-enhancing policies? *Annals of Regional Science*, *62*(3):601-635. https://doi.org/10.1007/s00168-019-00909-y

Brechling, F. (1967) Trends and cycles in British regional unemployment. *Oxford Economic Papers*, *19*(1):1-21. https://doi.org/10.1093/oxfordjournals.oep.a041034

Camacho, M., Pacce, M., Ariza, C.U. (2018) Regional business cycle phases in Spain. *Estudios de Economía Aplicada*, *36*(3):857-896. https://doi.org/10.25115/eea.v36i3.2558

Cuéllar-Martín, J., Martín-Román Á.L., Moral A. (2018) An empirical analysis of natural and cyclical unemployment at the provincial level in Spain. *Applied Spatial Analysis and Policy*, *12*(3):647–696. https://doi.org/10.1007/s12061-018-9262-x

De la Rica, S., Rebollo-Sanz, Y. (2017) Gender Differentials in Unemployment Ins and Outs during the Great Recession in Spain. *De Economist*, *165*:67–99. https://doi.org/ 10.1007/s10645-016-9288-x

Dolado, J.J., García-Peñalosa, C., De La Rica, S. (2013) On Gender Gaps and Self-Fulfilling Expectations: Alternative Implications of Paid-For Training. *Economic Inquiry, Western Economic Association International*, *51*(3):1829-1848. https://doi.org/10.1111/j.1465-7295.2012.00485.x

Elsby, M.W.L., Hobijn, B., Sahin, A. (2010) The Labour Market in the Great Recession. *Brookings Papers on Economic Activity*. Economic Studies Program. The Brookings Institution, *41*(1):1-69. https://doi.org/10.1353/eca.2010.0001

Elsby, M.W.L., Hobijn, B., Şahin, A. (2013) Unemployment Dynamics in the OECD. *The Review of Economics and Statistics 95* (2):530–548. https://doi.org/10.1162/REST_a_00277

Eurostat annual data (2022). Total unemployment rate. Percentage of population in the labour force. Available on: https://ec.europa.eu/eurostat/databrowser/view/tps00203/default/table?lang=en&category=t_labour.t_employ.t_lfsi.t_une Last update: 14/12/2023 [February 12, 2024]

Forrest, D., Naisbitt, B. (1987) The Sensitivity of Regional Unemployment Rates to the National Trade Cycle. *Regional Studies*, *22*(2):149–153. https://doi.org/10.1080/00343408812331344850

Forsythe, E., Wu, J.C. (2021) Explaining Demographic Heterogeneity in Cyclical Unemployment. *Labour Economics*, *69*: 101955 https://doi.org/10.1016/j.labeco.2020.101955.

Gadea M.D., Gómez-Loscos A., Montañés A. (2006) How many regional business cycles are there in Spain? A MS-VAR approach. *Fundación Economía Aragonesa FUNDEAR (Serie Investigación)*, Working Paper n. 27/2006.

Gadea, M.D., Gómez-Loscos, A., Montañés, A. (2012) Cycles inside cycles: Spanish regional aggregation. *SERIEs*. *3*(4):423–456. https://doi.org/10.1007/s13209-011-0068-1

Gomes, D.B. (2024). Gender and Business Cycles. International Monetary Fund Gender notes. NOTE/2024/001. ISBN: 9798400270376 Available on: https://www.elibrary.imf.org/downloadpdf/journals/067/2024/001/067.2024.issue-001-en.pdf

Jimeno, J.F., Bentolilla, S. (1998) Regional unemployment persistence (Spain, 1976-1994). *Labour Economics*, *5*(1):25-51. https://doi.org/10.1016/S0927-5371(96)00019-X

N. 39, 2025 – ISSN: 1886-516X – DOI: 10.46661/rev.metodoscuant.econ.empresa.10840 – [Págs. 1-13]

Lolos, S., Papapetrou, E. (2012) Unemployment disparities and persistence assessing the evidence from Greek regions, 1981-2008. *Regional and Sectorial Economic Studies*, *12*(1) Available on: https://www.usc.es/economet/reviews/eers1215.pdf

López-Bazo, E., Barrio, T.D., Artis, M. (2002). The regional distribution of Spanish unemployment: A spatial analysis. *Papers in Regional Science*, *81*(3):365–389. https://doi.org/10.1007/s101100200128

López-Bazo, E. and Motellón, E. (2013). The regional distribution of unemployment: What do micro-data tell us? *Papers in Regional Science*, *92*(2):383–405. https://doi.org/10.1111/j.1435-5957.2012.00456.x

Martín-Álvarez, J.M., Almeida, A., Galiano, A., Golpe, A.A. (2020) Asymmetric behavior of tobacco consumption in Spain across the business cycle: a long-term regional analysis. *International Journal of Health Economics and Management*, 20:391–421. https://doi.org/10.1007/s10754-020-09286-y

Moscone, F., Tosetti, E. (2009) A review and comparison of tests of cross-section independence in panels. *Journal of Economic Surveys*, *23*(3):528-561. https://doi.org/10.1111/j.1467-6419.2008.00571.x

Nagore-García, A. (2017) Gender Differences in Unemployment Dynamics and Initial Wages over the Business Cycle. *Journal of Labor Research*, *38*:228–260. https://doi.org/10.1007/s12122-017-9244-9

Pérez, J.J., Rodríguez, J., Usabiaga, C. (2003) Análisis dinámico de la relación entre ciclo económico y ciclo del desempleo: una aplicación regional. *Investigaciones Regionales – Journal of Regional Research*, *2*:141-162 http://hdl.handle.net/10017/32482

Petrongolo, B., Ronchi, M. (2020) Gender gaps and the structure of local labor markets. *Labour Economics*, *64*, 101819, https://doi.org/10.1016/j.labeco.2020.101819

Razzu, G., Singleton, C. (2016) Gender and the business cycle: An analysis of labour markets in the US and UK, *Journal of Macroeconomics*, *47*(B):131-146 https://doi.org/10.1016/j.jmacro.2015.12.006

Sala, H., Trivín, P. (2014) Labour market dynamics in Spanish regions: Evaluating asymmetries in troublesome times. *SERIEs*, *5*(2–3):197–221.

Şahin, A., Song, J., Hobijn, B. (2009) The Unemployment Gender Gap during the 2007 Recession. *Current Issues in Economics and Finance*, *16*(2), 1-7. http://dx.doi.org/10.2139/ssrn.1582525

Theodossiou, I., Zangelidis, A. (2009) Should I stay or should I go? The effect of gender, education and unemployment on labour market transitions. *Labour Economics*, *16*(5): 566-577 https://doi.org/10.1016/j.labeco.2009.01.006.

Thirlwall, A.P. (1966) Regional unemployment as a cyclical phenomenon. *Scottish Journal of Political Economy*, *13*:205-219. https://doi.org/10.1111/j.1467-9485.1966.tb00938.x

Vega, S.H., Elhorst, J.P. (2016) A regional unemployment model simultaneously accounting for serial dynamics, spatial dependence, and common factors. *Regional Science and Urban Economics*, *60*,C:85-95. https://doi.org/10.1016/j.regsciurbeco.2016.07.002

Villaverde, J., Maza, A. (2009) The robustness of Okun's law in Spain, 1980–2004: Regional evidence. *Journal of Policy Modeling*, *31*(2):289-297. https://doi.org/10.1016/j.jpolmod.2008.09.003.

Ying Feng, D.L., Rauch, J.E. (2024) Unemployment and Development. *The Economic Journal*, *134*(658):614–647, https://doi.org/10.1093/ej/uead076