Labor supply and the business cycle: The "Bandwagon Worker Effect"

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Labor supply and the business cycle: The "Bandwagon Worker Effect"

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Abstract

The relationship between the labor force participation and the business cycle has become a topic in the economic literature. However, few studies have considered whether the cyclical sensitivity of the labor force participation is influenced by "social effects". In this paper, we construct a theoretical model to develop the "Added Worker Effect" and the "Discouraged Worker Effect", and we integrate the "social effects", coining a new concept, the Bandwagon Worker Effect (BWE). To estimate the cyclical sensitivity of the labor force participation, we employ a panel dataset of fifty Spanish provinces for the period 1977–2015. Finally, we use spatial econometrics techniques to test the existence of the BWE in the local labor markets in Spain. Our results reveal that there exists a positive spatial dependence in the cyclical sensitivity of the labor force participation that decreases as we fix a laxer neighborhood criterion, which verifies the existence of the BWE. From the perspective of economic policy, our work confirms that "social effects" play a key role at the time of determining the economic dynamics of the territories.

Keywords: Labor force participation, business cycle, regional labor markets, bandwagon effect, spatial dependence.

JEL Codes: C23, D03, E32, J21, R23.

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1. Introduction

The aim of this paper is to analyze how the relationship between the business cycle and the labor force participation (LFP, hereafter) may be influenced by "social effects". The so-called "Bandwagon Effect" (BE, hereafter) is now an important element to better understand the demand for goods and services (Leibenstein, 1950). As the labor supply is, in the end, a demand for leisure, we deem that the BE might be also operating in the labor market. As a matter of fact, some studies are already exploring this possibility (Blomquist, 1993; Vendrik, 1998; Grodner and Kniesner, 2006; Grodner and Kniesner, 2008). However, our research goes one step ahead in linking this social effect to the cyclical properties of LFP and in coining the concept of "Bandwagon Worker Effect" (BWE, hereafter). As far as we know, this is the first time that this has been done.

The relationship between the business cycle and LFP has produced much academic work. The reason for this might be its great importance in understanding the functioning of the macroeconomic labor market (e.g., an adequate count of the "actual" unemployed workers in the economy, the magnitude of the "hidden unemployment", etc.). This body of research has given rise to two key concepts: the "Added Worker Effect" (AWE, hereafter) and the "Discouraged Worker Effect" (DWE, hereafter), which will be explained in considerable detail later. Here, we develop a theoretical framework, in which the BWE interacts with the AWE and DWE, and we test empirically whether the BWE is a significant factor, when considered together with the AWE and the DWE, to better understand cyclical movements in labor supply.

To do this, first we elaborate a microeconomic decision model, in which the AWE is conceptualized as an income effect and the DWE as an effect depending on the expectations of finding a job. These are the theoretical channels through which the original ideas of Woytinsky (1940), Humphrey (1940) (AWE), Long (1953) and Mincer (1962) (DWE) should operate. Then, we discuss the aggregation process, since, in the end, we are interested in a macroeconomic perspective. The next step is incorporating the BWE within the previous theoretical framework, under the assumption that the BWE is a social effect. Finally, we test empirically the relevance of the BWE in our data by means of spatial econometrics' techniques.

As for the contribution of this piece of research to the existing literature, to the best of our knowledge, the notion of BWE had not been analyzed in a systematic way so far. It is true that some papers have addressed the idea of "social influence" over individuals' decisions to participate in the labor market (e.g., Clark and Summers, 1982; Kapteyn and Woiitiez, 1987; Romme, 1990; Vendrik, 1998; Neumark and Postlewaite, 1998); however, none of them have studied explicitly the effect of that "social influence" on the cyclical sensitivity of aggregate labor supply. Hence, we deem that the theoretical conceptualization and modelling of the BWE is a first contribution to the state of the art.

Another feature that adds to the originality of this paper is the manner in which we test empirically the theoretical predictions of our model. We make use of conventional spatial econometrics techniques to do that. Moreover, the empirical test is derived straightforwardly from the theoretical framework. It could be stated that several papers analyzing some spatial aspects of the aggregate labor markets have been published recently (e.g., Overman and Puga, 2002; Cracolici et al., 2007; Halleck-Vega and Elhorst, 2014; Halleck-Vega and Elhorst, 2017). However, it has to be pointed out that, in this piece of research, the spatial analysis is not an end in itself but just a means to check whether the notion of the BWE is relevant. More precisely, we assume here that geographical neighborhood is a tool to capture the degree and the intensity of the "social effects", as will be explained in greater detail later. This empirical strategy has been employed before, although not coming directly from a theoretical model, as is done in the present paper.[1] Thus, this approach adds extra value to the article.

The main hypothesis of this research is that an individual's labor supply decisions are conditioned to a certain extent by his/her neighbors' decisions regarding their labor market activity. To be more specific, we develop a conceptual framework, in which the individuals emulate to some degree their neighbors' behavior as to their labor supply decisions. This microeconomic individual behavior has to be scaled up to macroeconomic size since this paper makes use of aggregate data. In this vein, our theoretical framework, firstly, describes the required aggregation process and, secondly, bridges the gap between the notion of "social effect" and the spatial analysis that will be used to test whether such an effect is relevant.

Hence, what we expect is that the LFP rate of a spatial unit is influenced by the participation rates (PRs, hereafter) in neighboring areas. Even more precisely, the above-mentioned "social effect" may also be interpreted as a positive spatial correlation among the spatial units considered. Thus, the previous discussion implies that the participation rate (PR, hereafter) of a spatial unit surrounded by high-level PR spatial units would be higher than otherwise, and vice versa. As will be formally proved later, this positive spatial correlation between the levels of PRs can be translated into a positive spatial correlation between the cyclical sensitivity of those PRs. This is what, in the end, allows us to make use of a well-known spatial analysis tool, the Moran's I scatterplot, to test the theory in a straightforward manner. It is also worth mentioning that we check not only the sign of the relationship but also its intensity. We hypothesize that the higher the level of closeness or neighborhood, the stronger the "social effect". To validate this derivative hypothesis, we define several neighborhood spatial matrixes, ordering them from most to least spatial closeness, and verify whether the spatial pattern we expect is fulfilled.

The results obtained show a positive and significant global spatial dependence in the cyclical sensitivity of the LFP in the Spanish provinces (NUTS-3 regions).[2] According to our theoretical approach, this finding proves that the BWE is a key phenomenon to help understand the overall functioning of the aggregate labor market. This result is robust to two different neighborhood criteria and two different trend-cycle decompositions of time series. Moreover, we also find that, as the neighborhood definition becomes laxer, the strength of the "social effect" diminishes. This outcome is consistent with the overall theoretical framework developed here, which might be also considered as either an additional sensitivity analysis or an extra robustness check, and, thus, gives the paper more credibility.

With respect to the significance and relevance of this piece of research, some comments can be made. From a strictly academic point of view, we would like to highlight three points. First, the present paper defines a new effect — the BWE — affecting the cyclical properties of aggregate supply. Thus, it contributes to a vast body of literature from a fresh perspective. Second, we not only define the BWE but also formalize it by means of a theoretical model. Third, the BWE is also tested empirically. What is more relevant, the econometric test is not a predefined test with weak links to the theory developed in this article but arises directly from the theory.

[1] See Martín-Román et al. (2015) for an application of this type of econometric technique to analyze the presence of peer effects in the judicial decisions in Spain.

[2] The 50 Spanish provinces correspond to the third level (NUTS-3) of the Nomenclature of Territorial Units for statistics, see: http://ec.europa.eu/eurostat/web/nuts/overview.

Other relevant aspects can be obtained from this work, most of them having to do with economic policy implications. Thus, policy makers should take into account, when designing their economic policy measures, that there are geographical spillover effects affecting labor supply that might condition such measures. Particularly, the economic policy ought to be implemented on a geographical basis. Spatial areas, instead of single spatial units, should be the economic policy target when devising policy actions thought to improve problems related to the cyclical pattern in labor supply (e.g., hidden unemployment in recessions).

The remainder of the work is organized as follows. Section 2 offers a review of the literature related to the topic in hand. Section 3 develops the theoretical model. Section 4 presents the methodology and the database used both to study the relationship between the local labor PRs and the business cycle and to test the BWE. Section 5 presents and explains the results obtained in the cyclical sensitivity analysis and in the spatial dependence analysis. This section also includes some economic policy implications of our results. Finally, section 6 sums up the most relevant conclusions.

2. Literature review

This section reviews the literature related to the main topics in this research: the cyclical sensitivity of the LFP, the importance of the space in the labor market variables, and the social group influences in the decisions of the individuals in the labor market context.

2.1. The labor force participation and the business cycle

As we explain before, the two key concepts in the relationship between the business cycle and the LFP are the AWE and the DWE. The two seminal works related to the AWE are Woytinsky (1940) and Humphrey (1940). This effect establishes that the LFP maintains countercyclical behavior. Conversely, the origin of the DWE is found in Long (1953) and Mincer (1962). Through this effect, the unemployed workers leave the labor force during the recessive phases of the business cycle. According to the above, the AWE causes an overestimation and the DWE an infraestimation of the unemployment rate.

The empirical evidence about these two effects is mixed, depending on various factors of the labor market (geographical location, gender, etc.). The first work where the AWE is present is Maloney (1987), where 1.585 couples are analyzed in the case of the USA. Emerson (2011) also finds this effect during the period 1948–2010. In the work of Del Boca et al. (2000) the AWE is also found in Italian households, where female participation in the labor market is not seen as “social stigma”. Ghignoni and Verashchagina (2016) also identify the same effect for Italy. Parker and Skoufias (2004) detect empirical evidence of the AWE in Mexico during the periods 1994–1995 and 1995–1998. Other research that offers empirical evidence of the AWE is the work of Gałecka-Burdziak and Pater (2016), for Poland. In the Spanish case, this effect is found in Prieto-Rodríguez and Rodríguez-Gutiérrez (2000), Prieto-Rodríguez and Rodríguez-Gutiérrez (2003), and partially in Congregado et al. (2011).

If we focus our attention on the DWE, Long (1958) finds that this effect predominates in the USA during the “severe recessive phases of the business cycle”. Clark and Summers (1981) obtain analogous results, putting great emphasis on the behavior of different demographic groups. Similarly, Leppel and Clain (1995) detect this effect in focusing on the gender of the individuals, and, in Benati (2001), the DWE is present from an aggregate point of view. In Darby et al. (2001), the DWE is still present for the case of women between forty-five and fifty-four years old in Japan, France, and the USA. Finally, empirical evidence is provided by Lenten (2001) and O´Brien (2011), for Australia; Österlhom (2010), for Sweden; and Martín-Román and Moral de Blas (2002) and, partially, Congregado et al. (2014), for Spain. To conclude, in Wachter (1972), Wachter (1974) and Tano, (1993) neither of these effects is present.

2.2. Space and the labor market

The growing interest of economists in knowing the economic dynamics from a territorial perspective, as well as the gradual development of spatial econometric techniques, has resulted in a great amount of academic research in recent decades (Marston, 1985; Blanchard and Katz, 1992; Decressin and Fatas, 1995; Taylor and Bradley, 1997). Following on from the above, many empirical studies have focused on the influence of space on the behavior of individuals in the labor market. There are studies focusing on the differences in the unemployment rates among territories (countries, regions, etc.) and their persistence in time (Molho, 1985; Jimeno and Bentolila, 1998; Overman and Puga, 2002; López-Bazo et al. 2002; López-Bazo et al. 2005; Filiztekin, 2009; Kondo, 2015). Nevertheless, there are also studies that analyze the effects of the aggregate demand shocks in the labor demand and the possible spillover effect that arises in the adjacent territories (Halleck Vega and Elhorst, 2014). Other studies focus on the role that space plays in the process of matching the individuals in the labor market (Haller and Heuermann, 2016). Finally, we can highlight studies looking at the influence of territory in LFP (Halleck Vega and Elhorst, 2017).

2.3. The influence of the social group on labor market participants

The influence of social group behavior on an individual's decisions is known in the literature as the "Peer Effect" (Manski, 1993; Manski, 2000; Dietz, 2002). Briefly, this is a phenomenon whereby individual's preferences and decisions are affected by the behavior of other individuals' belonging to his/her social group. In the case of economics (particularly in microeconomics), a similar effect has been named as BE for the demand of goods and services. Such effect describes that the behavior of an individual is not only determined by his/her personal features but it's also influenced by the actions and decisions of his/her peers (Leibenstein, 1950; Pollak, 1976; Granovetter and Soong, 1986; Van Herpen et al., 2009).

There are also some studies that apply this approach to study the participants' behavior in the labor market. Blomquist (1993) elaborates a model where the worker's preferences regarding labor market outcomes are interdependent with other individuals' behavior. Likewise, there are studies where the decision to participate in the labor market is influenced by either the action of the so called "social group" or the existence of a "social norm." Vendrik (1998) and Vendrik (2003) establish that the workers labor supply is determined not only by his/her individual preferences but also by other individuals' labor market participation decisions. A similar approach can be found in Kapteyn and Woittiez, (1987), Neumark and Postlewaite, (1998), Romme, (1990), Grodner and Kniesner (2006) and Grodner and Kniesner (2008).

Möller and Aldashev (2006) use spatial econometric techniques to test the existence of "social effects" in the PRs in West and East Germany. Loog (2013) also adopts this perspective in relation to the working hours of a sample of public workers in Germany between 1993 and 2005. In line with the above, Collewet et al. (2017) point out that there is a small peer effect in the working time of a sample of Dutch male employees during 1994–2011. Similar results can be found in Weinberg et al. (2004). Finally, Woittiez and

Kapteyn (1998) and Maurin and Moschion (2009) also find relevant social effects in the labor supply of women.[3]

3. Theoretical model

3.1. Basic theoretical setting

In this section, we construct a labor market participation model. As we are interested in the extensive margin of the labor supply, we consider a fixed working week. In this way, labor supply choices coincide with participation decisions. Some examples of this kind of model can be found in Boeri and van Ours (2013), Cahuc et al. (2014), and Martin-Roman (2014). However, that model is here extended to take into account the effects of unemployment. Some important assumptions of the model are listed below:

Assumption 1. *Labor is homogenous. This implies that the wage is the same for all workers.*[4]

Assumption 2. *Labor contracts last one period. To sign a new contract, it is always necessary to spend a fixed amount of time in job-search activities, as specified in the next assumption.*

Assumption 3. *A certain amount of time is associated with labor participation. Before signing a new contract, the worker has to devote* s *units of time to job-searches. Here,* s *is considered to be a fixed and exogenous sum of time.*[5]

Assumption 4. *A positive unemployment rate exists. Such a rate determines the likelihood* p *of finding a job, which is the same for all individuals.*[6]

Assumption 5. *The size of the working week, which we denote by* $\bar{l}$*, is fixed and exogenously determined.*[7]

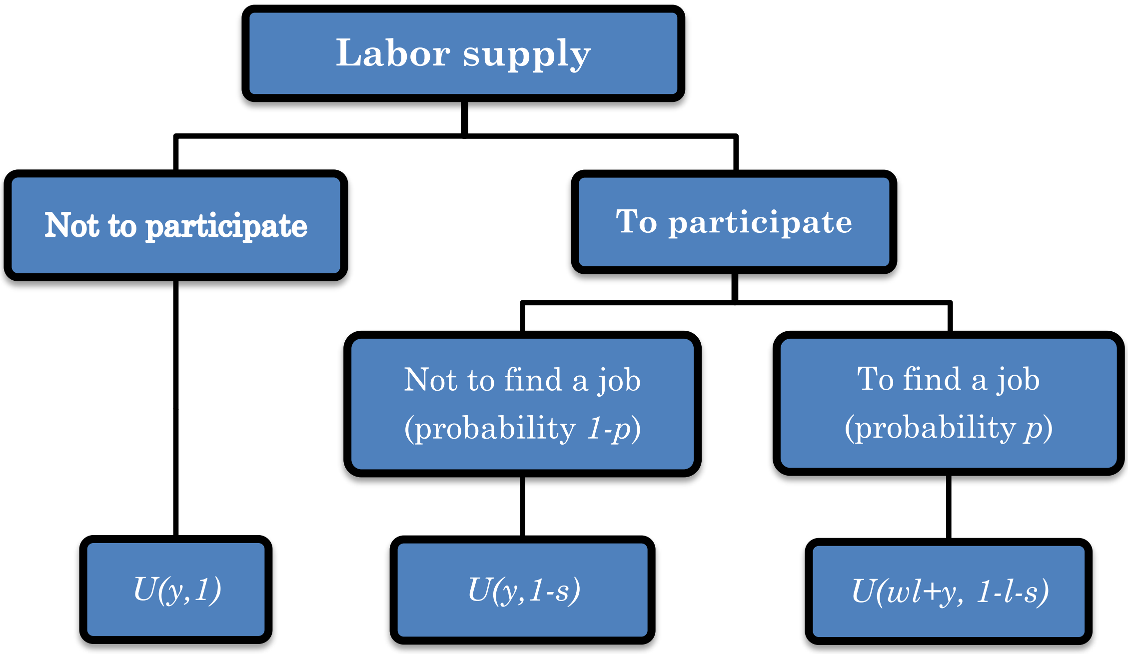
Assumption 6. *The utility function is additive. To put it another way, if we denote* C *as the consumption (or the total income because there is no saving) and* H *as the leisure time (i.e., total time minus hours of work), this assumption establishes that* $U(C,H) = \Lambda(C) + \Omega(H)$*. As usual, marginal utilities are supposed to be positive and decreasing.*[8]

The set of alternatives for the worker is shown in Figure 1. Inside the utility function, the levels of consumption and leisure have been replaced by the corresponding

[3] Other works that adopt a different perspective regarding social influences on individuals in the labor market are Casella and Hanaki (2008), Tassier and Menczer (2008), and Koursaros (2017).
[4] This assumption is adopted because of the macroeconomic orientation of the paper.
[5] It is out the scope of the paper to consider s as an endogenous variable. That is the field of job-search theory. This theory was pioneered by Mortensen (1970) and McCall (1970). See Lippman and McCall (1976a), Lippman and McCall (1976b), Mortensen (1986) and Mortensen and Pissarides (1999) for some classical surveys on the topic. Recent examples of this kind of literature are Tatsiramos and van Ours (2012) and Tatsiramos and van Ours (2014).
[6] In other words: unemployment is primarily involuntary. Obviously, the higher the unemployment rate, the lower p.
[7] As we are interested in the extensive margin of the labor supply, this assumption allows us to focus on the participation decision.
[8] This assumption is less restricting than it seems at first glance. Firstly, it is well known that this sort of utility function generates indifference curves that, typically, decrease and are convex to the origin. Secondly, within the ordinal utility theory, a logarithmic transformation of the very well-known Cobb–Douglas utility function is additive, representing an identical set of preferences.

values associated with each decision. In this way, we are already taking into account the budget constraints within the choice framework. As can be seen in Figure 1, w is the real wage per unit of time, $\bar{l}$ stands for the duration of the fixed working week, y is the real non-labor income, and s stands for the job-search duration linked to the participation decision. Total time has been normalized to 1.

Figure 1. Set of alternatives for the worker.



Source: Own elaboration.

According to Figure 1, an individual has two options. Each of these options is associated with a level of utility, either certain or expected: (1) not to participate and (2) to participate, which can be formalized, respectively, as:

(1) $$U(y,1),$$

(2) $$pU\left(w\bar{l}+y,1-\bar{l}-s\right)+(1-p)U(y,1-s)$$

The reservation wage for an individual (w^R) might be defined, as usual, as the value of w equating both options. It is easy to prove from expression (3) that w^R is always positive ($w^R>0$):[9]

(3) $$pU\left(w^R\bar{l}+y,1-\bar{l}-s\right)+(1-p)U(y,1-s)=U(y,1)$$

3.2. Aggregation process

If workers have different preferences over consumption–income and leisure–work and different non-labor incomes, they will also have different reservation wages. This diversity of reservation wages $w^R\in[0,+\infty)$ might be represented by a cumulative distribution function $\phi(\cdot)$. If the rest of the PR determinants do not change (i.e., non-labor

[9] Focusing first on leisure time we have that $1>(1-s)>(1-\bar{l}-s)$. This would entail that $w^R\,\bar{l}>y$ in order to attain an equality in (3), which in turn implies that $w^R>0$.

income and likelihood of finding a job in our theoretical setting) the aggregate labor supply could be expressed in formal terms according to (4):

$$L = N \cdot \phi(\cdot) \tag{4}$$

where L stands for the labor force, and N stands for total working age population. Therefore, the PR is simply $\phi(\cdot)$, as expressed in equation (5):

$$PR = \frac{L}{N} = \phi(\cdot) \tag{5}$$

Inasmuch as $\phi(\cdot)$ is a cumulative distribution function, by definition, that proportion is increasing in its argument, $\phi_w > 0$. Nevertheless, as we will show below, not only the non-labor income but also the likelihood of finding a job plays an important role in determining PR, because both of them do change. To incorporate this idea, let us call w_M^R the reservation wage for the median individual within the cumulative distribution. In this way, a stylized PR function could be described by means of expression (6):

$$PR = \phi(w, w_M^R) \tag{6}$$

As mentioned before, $(\partial PR/\partial w) > 0$, by definition. Furthermore, it is consistent with the concept of a reservation wage $(\partial PR/\partial w_M^R) < 0$. Finally, it is worth recalling that w_M^R is, in turn, a function of some additional arguments. In the model developed here, w_M^R will depend on y and p. In addition, we must point out that both $y(Z)$ and $p(Z)$ are regarded as functions of the business cycle (Z). We will consider that, if our measure of the business cycle (Z) increases, the state of the economy improves, whereas, when Z decreases, the economy worsens. Thus, we may rewrite expression (6) as follows[10]:

$$PR = \phi(w, w_M^R[y(Z), p(Z)]) \tag{7}$$

Equation (7) reveals that PR depends on the business cycle through a double channel: cyclical variations in the median worker's non-labor income that will give rise to the AWE, and cyclical changes in the likelihood of finding a job that will result in the DWE.

3.3. The Added Worker Effect

According to the conventional view of the AWE (Woytinsky, 1940), some breadwinners lose their jobs during an economic downturn. As a consequence of this, their spouses would experience a reduction in their non-labor income, and this, in turn, would reduce their reservation wage, and, at an aggregate level, PR would rise. The opposite would be true in an economic boom. It is easy to demonstrate that this result fits well in our theoretical framework. We first create an implicit function $R(\cdot) = R\left(w_N^R, y, p, \bar{l}, s\right)$ from equation (3), which is defined by the following expression:

$$R(\cdot) = pU\left(w^R\bar{l} + y, 1 - \bar{l} - s\right) + (1 - p)U(y, 1 - s) - U(y, 1) = 0$$

and then we make use of the implicit function theorem:

[10] The basic exposition of this aggregation process may be found in some labor economics' textbooks (e.g. Boeri and van Ours, 2013; Cahuc and Zylberberg, 2004; Cahuc et al. 2014). The idea of the cumulative distribution function $\phi(\cdot)$ comes from Cahuc and Zylberberg (2004). The idea of PR function depending on the reservation wage of the median individual which, in turn, depends on the business cycle is ours.

(8) $$\frac{\partial w_N^R}{\partial y} = -\frac{\partial R/\partial y}{\partial R/\partial w^R} = -\frac{pU_C\left(w_N^R\bar{l} + y\right) + (1-p)U_C(y) - U_C(y)}{p\bar{l}U_C\left(w^R\bar{l} + y\right)} > 0$$

It is quite evident that a reduction of the non-labor income (as a consequence of a downturn) would decrease the reservation wage of the median worker. This, in turn, would encourage labor participation. In more formal terms (maintaining p constant), we may characterize the AWE by means of (9):

(9) $$\left.\frac{\partial PR}{\partial Z}\right|_{\bar{p}} = \frac{\partial PR}{\partial w_M^R} \cdot \frac{\partial w_M^R}{\partial y} \cdot \frac{\partial y}{\partial Z} < 0$$

since we know that $\partial y/\partial Z > 0$ (by hypothesis), that $\partial w_M^R/\partial y > 0$ (from the discussion in this section), and that $\partial PR/\partial w_M^R < 0$ (from the concept of reservation wage).

3.4. The Discouraged Worker Effect

The original idea of the DWE (Long 1953, 1958) holds that, when the likelihood of finding a job falls, some workers quit active job searches (i.e., they become inactive) and that the opposite occurs when the likelihood of finding a job rises. The rationale behind this is that, as the expectations of finding a job worsen, the transaction costs linked to the search process could exceed the benefits expected from it, since these expected benefits diminish. The way of formalizing the DWE within the model is by means of p. Taking equation (3) and making use again of the implicit function $R(\cdot) = R\left(w_N^R, y, p, \bar{l}, s\right)$, it is straightforward to compute the effects of changes in p on w^R:

(10) $$\frac{\partial w^R}{\partial p} = -\frac{\partial R/\partial p}{\partial R/\partial w^R} = -\frac{U\left(w^R\bar{l} + y, 1 - \bar{l} - s\right) - U(y, 1-s)}{p\bar{l}U_C\left(w^R\bar{l} + y\right)} < 0$$

The negative sign of (10) is the result of the definition given in (3). First, it is obvious that $U(y,1) > U(y, 1-s)$. Second, to achieve equality in (3) $U\left(w^R\bar{l} + y, 1 - \bar{l} - s\right) > U(y,1) > U(y, 1-s)$ must be fulfilled. In other words: when p rises (drops), w_N^R decreases (increases). It is possible to obtain a stylized mathematical version of the DWE (maintaining non-labor income constant) through expression (11):

(11) $$\left.\frac{\partial PR}{\partial Z}\right|_{\bar{y}} = \frac{\partial PR}{\partial w_M^R} \cdot \frac{\partial w_M^R}{\partial p} \cdot \frac{\partial p}{\partial Z} > 0$$

As before, we can affirm that $\partial p/\partial Z > 0$ (by hypothesis), that $\partial w_M^R/\partial p < 0$ (from the discussion in this section), and that $\partial PR/\partial w_M^R < 0$ (from the concept of reservation wage).

3.5. The Total Effect

Once we have described the two theoretical effects separately, we put them together and analyze their effects jointly. When, for instance, the economy enters a recession, the PR would fall as a consequence of the DWE and experience an increase because of the AWE. What may be observed directly through the data is the net effect, i.e., the sign of (12):

(12) $$\frac{\partial PR}{\partial Z} = \underbrace{\frac{\partial PR}{\partial w_M^R}}_{(-)} \left(\underbrace{\frac{\partial w_M^R}{\partial y} \cdot \frac{\partial y}{\partial Z}}_{AWE(+)} + \underbrace{\frac{\partial w_M^R}{\partial p} \cdot \frac{\partial p}{\partial Z}}_{DWE(-)} \right) = \beta^* \gtreqless 0$$

3.6. The Bandwagon Worker Effect

The aim of this paper, however, is to define and formalize a second-order theoretical effect: the BWE. This would be an extension of the well-known BE established for the demand for goods and services (Leibenstein, 1950). In the present context, a rather direct way of introducing the notion of BE into the labor supply decisions is just by letting the reservation wage be a function of the PR of neighboring areas, $PR^N(Z)$, which, in turn, also depends on the business cycle.[11] In formal terms:

(13) $$PR = \phi(w, w_M^R[y(Z), p(X), PR^N(Z)])$$

According to the basic idea of BE, an individual would demand more of a good or a service if his/her social environment does so. Thus, in our context, a worker will demand relatively more leisure, all the things equal, if he/she lives in a society of "leisure lovers", and vice versa. Therefore, if the PR in the neighboring areas increases, the reservation wage of the median worker should decline: $\partial w_M^R / \partial PR^N < 0$. Taking this last effect into account, now, the total effect of the business cycle on labor market participation might be stated formally by expression (14), instead of by (12):

(14) $$\frac{\partial PR}{\partial Z} = \underbrace{\frac{\partial PR}{\partial w_M^R}}_{(-)} \left(\underbrace{\frac{\partial w_M^R}{\partial y} \cdot \frac{\partial y}{\partial Z}}_{AWE(+)} + \underbrace{\frac{\partial w_M^R}{\partial p} \cdot \frac{\partial p}{\partial Z}}_{DWE(-)} + \underbrace{\frac{\partial w_M^R}{\partial PR^N} \cdot \frac{\partial PR^N}{\partial Z}}_{BWE(?)} \right) = \beta^+ \gtreqless 0$$

As can be appreciated in expression (14), the BWE affects the cyclical behavior of PRs in an a priori unknown form, because, despite the sign of $\partial w_M^R / \partial PR^N < 0$ being well-defined, $\partial PR^N / \partial Z$ could be either positive or negative depending on whether the AWE or the DWE prevail in the neighboring areas. Thus, it is not possible to affirm that β^* is either higher or lower than β^+. In fact, the BWE is found to be relevant to understanding labor market participation, since the second-order derivative calculated in expression (15) has a well-defined positive sign:

(15) $$\frac{\partial^2 PR}{\partial Z \partial \left(\frac{\partial PR^N}{\partial Z} \right)} = \frac{\partial PR}{\partial w_M^R} \cdot \frac{\partial w_M^R}{\partial PR^N} > 0$$

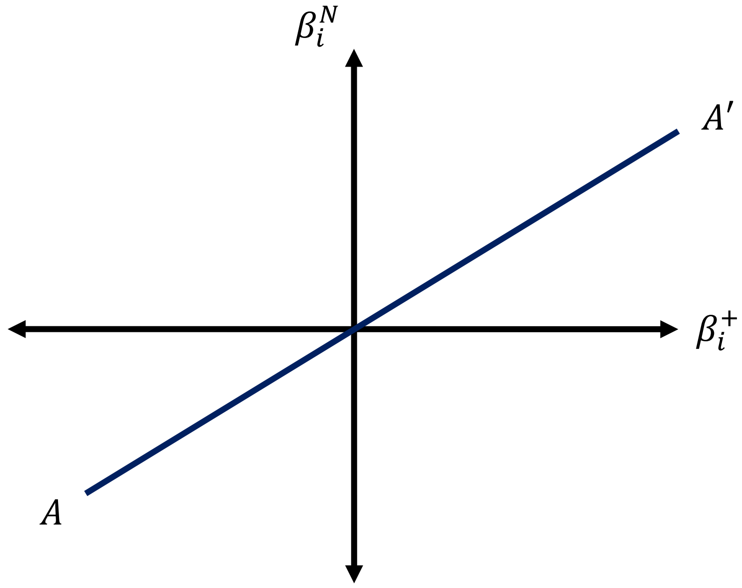
In words, expression (15) tells us that the PR cyclical pattern of a specific area is positively related to the cyclical pattern shown in the PRs of neighboring areas. Put another way, if we measure the cyclical sensitivity of the PR in a specific region "i" (by means of an econometric procedure) and call it β_i^+, it ought to be positively related to the "average" PR cyclical sensitivity in the neighboring areas (of region "i"), which is denoted here by β_i^N. Formally, this could be represented by means of expression (16) and

(16) $$\frac{\partial \beta_i^N}{\partial \beta_i^+} > 0$$

[11] The variable PR^N should be thought of as a sort of a weighted average of the different PRs in the neighboring areas. In a later section, we will go into further details explaining how we measure this in practical terms.

The mathematical relationship shown in (16) could be graphically depicted as line AA' in Figure 2. However, this apparently trivial diagram has a powerful and straightforward interpretation. It would correspond to Moran's scatterplot (with the axis being properly centered around the normalized values of β_i^+ and β_i^N), a widely used tool in spatial econometrics. Thus, our theoretical framework allows us to test easily and directly the BWE, and it is relevant to understanding the PR cyclical patterns. This will be done in a subsequent section.

Figure 2. Cyclical PR sensitivity of an area as a function of the cyclical PR sensitivity of neighboring areas



Source: Own elaboration.

4. Methodology and database

To test for the presence of the BWE we need to apply two different techniques. Firstly, it is necessary to estimate the cyclical sensitivity of the labor force. In a second stage, we test the existence of spatial patterns in the coefficients obtained. Finally, the third part of this section provides a brief description of the database.

4.1. The cyclical sensitivity of the labor force

To study the cyclical sensitivity of the labor force in Spain, we employ a panel dataset composed of the fifty Spanish provinces for the period 1977–2015. As we have explained before, we try to verify if the AWE, the DWE, or none of those effects prevail in these territories. For this, we rely initially on equation (17):

(17) $$CPR_{it} = \alpha + \beta_i \cdot CUR_{it} + D_{2001} + \mu_i + \varepsilon_{it}$$

where CPR_{it} refers to the cyclical component of the PR of province *i* in year *t*; α is the constant of the regression; CUR_{it} is the cyclical component of the unemployment rate; D_{2001} is a dichotomous variable, which takes the value 1 after the year 2001, and 0 otherwise;[12] μ_i represents the provincial fixed effects; and, finally, ε_{it} stands for the disturbance term. By this procedure we obtain fifty estimations of the cyclical sensitivity of the labor force (β_i), one for each Spanish province.

The main problem lies in obtaining the CPR_{it} and the CUR_{it}. This is because the cyclical component of the variables cannot be observed, and it has to be estimated. The economic literature provides several methods for obtaining these cyclical components; one of these is the Hodrick–Prescott filter (Hodrick and Prescott, 1997) (HP, hereafter). The first step to apply this filter is to choose a value for the λ parameter. In this case we use λ=400 because this value is very common in the economic literature when working with annual data (Backus and Kehoe, 1992; King and Rebelo, 1993; Maravall and Del Río, 2001). To test the robustness of the results, we use two additional alternatives: the Quadratic Trend procedure (QT, hereafter)[13] and the HP filter, but with λ= 100.[14]

Once equation (17) is estimated, if β_i is statistically significant and greater than 0, the AWE prevails in that zone. If β_i is less than 0 and statistically significant, the DWE dominates. Finally, if the value of β_i is not significant, neither of the previous effects dominates the other. To avoid various econometric problems (spurious correlation etc.) it is necessary to test if the cyclical components of the PR and the unemployment rate are stationary. For this reason, we have carried out several unit-root panel data tests (table A1 in the Appendix).[15] The results let us conclude that our cyclical components, obtained with the HP (for both λ parameter values) and the QT procedure, are stationary.

4.2. Spatial analysis of the cyclical sensitivities

Once the fifty cyclical coefficients of the PR at a provincial level are estimated, the next step is to carry out the spatial analysis to test for the presence of the BWE. First, it is necessary to define a neighborhood criterion by means of a weight spatial matrix. Further, to check the robustness of the results we opted to conduct the analysis employing various alternative spatial weight matrixes.[16] To detect if there is global spatial dependence, we compute the Global Moran´s I, (Moran, 1948) which is defined as follows:[17]

$$(18) \qquad I = \frac{N}{S_0} * \frac{\sum_{i,j}^{N} SW_{i,j}\,(x_i-\bar{x})(x_j-\bar{x})}{\sum_{i=1}^{N}(x_i-\bar{x})^2}$$

where N is the sample size, SW_{ij} refers to the components of the spatial weights' matrix, x_i represents the value of variable x in province i, x_j represents the value of variable x in province j, S_0 is equal to $\sum_i \sum_j w_{ij}$, and, finally, $\bar{x}$ corresponds to the sample mean of variable x. The Global Moran's I takes values between 1 and -1. If the values are close to 1, there is positive spatial dependence, and there is negative spatial dependence if the values

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[12] This dichotomous variable is introduced because, in 2001 a methodological change was implemented that affected how unemployment was measured. This methodological change may be seen at http://www.ine.es/epa02/meto2002.htm.

[13] This method is based in a linear regression of the data that we want to decompose, using the linear and the quadratic component of a trend as independent variables. In this way, we extract both the trend component of the data previously mentioned and the disturbance term, which is identified with the cyclical component

[14] It should be mentioned that there are econometric alternatives to these two methods, such as the Baxter-King filter (Baxter and King, 1999) and, other "more complex" strategies (Phillips curve, Kalman filter, etc.).

[15] These panel tests, basically, are an extension of the ADF test ("Augmented Dickey–Fuller") applied to a panel data structure. In the case of the Harris–Tzavalis test, the Levin–Lin–Chu test and the Breitung test, it is assumed that the unit-root procedure is homogeneous. By its part the Im–Pesaran–Shin test allows to examine the presence of cross-section dependence in the unit-root procedure.

[16] See Moreno and Vayá (2002) for a very extensive explanation.

[17] Cliff and Ord (1981) confer this statistic with an advantage over the other spatial dependence indices.

are close to -1.[18] It is important to point out that the results of the spatial dependence analysis are used as an indicator of the BWE about the individuals' decision to participate in the labor market, i.e., AWE and DWE are also the result of a social effect associated with the behavior observed in the environment.

4.3. Database

For the purpose of this research, we need annual information of the unemployment rate and the LFP. We use annual data taken from the Labor Force Survey (Encuesta de Población Activa, EPA) drawn up by the National Statistics Institute (Instituto Nacional de Estadística, INE) for the fifty Spanish provinces (NUTS-3). The information used focuses on the period 1977–2015. Finally, to provide more detailed information concerning the variables used, Appendix (table A2) offers some descriptive statistics.

5. Results

This section is divided into three sub-sections. Firstly, we show the results obtained for the cyclical sensitivity of the labor force. Secondly, we present the main results for the spatial analysis. Finally, the last sub-section discusses the principal policy implications of our work.

5.1. Results for the AWE and the DWE

Table 1 exposes the results of estimating equation (17) when the cyclical components of the variables are obtained by the application of the HP filter with λ=400. Also, and because of the length of the period, we consider that it could be interesting to analyze what happens in two shorter periods: 1977–1996 and 1997–2015. Columns 2 and 3 in table 1 include the estimations of these two sub-periods.

The results show twenty-two statistically significant coefficients for the period 1977–2015, and the DWE prevails over the AWE in nineteen of them. In the case of the first sub-period (1977–1996), twenty-seven provinces present results that are statistically significant, with the DWE as the most relevant effect. The AWE is present only in four territories. For the second sub-period (1997–2015), seven provinces show statistically significant results, and the DWE is the predominant effect in four of them.

To test the robustness of the results, we re-estimate the sensitivity of the LFP with the cyclical components obtained by using the QT procedure and the HP filter with λ= 100 (table A3 in the Appendix). For the whole period, the results are quite similar to those obtained before, with a great number of statistically significant results, especially when we employ the QT procedure. The principal effect is the DWE, which is present in thirty provinces out of a total of thirty-four provinces that have statistically significant results. For the two sub-periods, the DWE also predominates in most of the provinces were the results are statistically significant. We have only found AWE in Lugo and Corunna (A) between 1977 and 1996 and in Palencia, Caceres, and Huelva between 1997 and 2015. In the case of the HP filter with λ=100, we obtain the same results. The DWE also predominates for the whole period and for the first sub-period.

[18] The existence of positive spatial dependence means that areas with "high" ("low") values of the target variable are surrounded by other areas that also display "high" ("low") values for said variable. Negative spatial dependence indicates that the areas with "high" ("low") levels in the variables studied are located close to other territories where said variable displays "low" ("high") values.

Figure A1 in the Appendix includes two scatterplots that confirm the robustness of the estimations. The results obtained by the HP filter with $\lambda = 400$ and $\lambda = 100$ are positively correlated with a R^2 equal to 0.85 and a correlation coefficient (ρ) of 0.92. Also, the same pattern is maintained when we observe the relationship between the estimations of the HP $\lambda = 400$ and the QT procedure; in this case the R-squared is 0.79 and ρ is 0.89.

Table 1. Cyclical sensitivity of the labor force participation (HP λ=400)

	1977–2015	1977–1996	1997–2015
Alava	-0.140*	-0.320***	-0.006
Albacete	0.030	-0.031	0.040
Alicante	-0.087	-0.223**	-0.007
Almeria	-0.112**	-0.557***	-0.039
Asturias	-0.006	0.001	0.009
Avila	0.046	0.185**	0.076
Badajoz	0.003	-0.207***	0.106
Balearic Islands	-0.043	-0.245**	0.038
Barcelona	-0.055	-0.052	-0.062
Burgos	-0.134*	-0.152	-0.109
Caceres	0.102**	-0.040	0.159***
Cadiz	0.047	0.012	0.050
Cantabria	-0.170**	-0.179	-0.187**
Castellon de la Plana	-0.139**	-0.275**	-0.090
Ciudad Real	-0.068	-0.105	-0.033
Cordoba	0.000	-0.173**	0.076
Corunna (A)	0.080	0.633***	-0.105
Cuenca	-0.041	-0.155	0.010
Girona	-0.259***	-0.512***	-0.142
Granada	-0.010	-0.218***	0.057
Guadalajara	-0.190***	-0.265***	-0.085
Guipuzcoa	-0.169**	-0.105	-0.293**
Huelva	0.075*	-0.112*	0.189***
Huesca	-0.080	0.002	-0.140
Jaen	0.029	-0.176**	0.130**
Leon	0.007	-0.342*	0.055
Lleida	-0.138	0.335**	-0.170
Lugo	0.164*	0.508**	0.109
Madrid	-0.142**	-0.063	-0.196**
Malaga	0.034	0.020	0.043
Murcia	-0.095*	-0.418***	-0.032
Navarre	-0.178**	-0.141	-0.194
Orense	-0.076	-0.707***	0.033
Palencia	0.034	-0.113	0.121
Palmas (Las)	-0.094*	-0.208**	-0.013
Pontevedra	-0.090	0.007	-0.115

Table 1 (continuation)

	1977–2015	1977–1996	1997–2015
Rioja (La)	-0.158**	-0.185**	-0.134
Salamanca	0.072	0.053	0.111
S C Tenerife	0.031	0.010	0.010
Segovia	-0.077	0.053	-0.140
Seville	-0.077*	-0.051	-0.074
Soria	-0.135	-0.526***	0.066
Tarragona	-0.245***	-0.378***	-0.116
Teruel	-0.126	-0.268*	-0.151
Toledo	-0.080	-0.131	0.005
Valencia	-0.095**	-0.115*	-0.116
Valladolid	-0.231***	-0.400***	-0.117
Vizcaya	-0.119*	-0.081	-0.177
Zamora	-0.170**	-0.163	-0.213**
Saragossa	-0.063	-0.139*	-0.038

Notes: *, **, and *** shows statistical significance at 10%, 5%, and 1% levels, respectively. **Source:** Own elaboration.

5.2. Spatial analysis of the cyclical sensitivities

Once we have estimated the cyclical sensitivities, we study whether there is a social influence in our results. The theoretical model suggested that the PR cyclical pattern of a specific area is positively related to the cyclical pattern shown in the PRs of neighboring areas. This effect, named BWE, may be easily tested by means of spatial econometric techniques in line with that expressed in equation (16). To begin the analysis, it is necessary to establish a neighborhood criterion, such as either the k-nearest neighbors (Knn) or the inverse distance (ID).[19] In this paper we use ten different Knn matrices ($K = 1 \dots 10$) where the specification of the spatial weights is.

$$SW_{i,j} = \begin{cases} 1, & if\ centroid\ of\ j\ is\ one\ of\ the\ k\ nearest\ centroids\ to\ that\ of\ i \\ 0, & otherwise \end{cases}$$

We also apply ten ID matrices for different values of α ($\alpha = 3, 2.75, \dots 0.75$) and the following spatial weights:

$$SW_{ij} = \begin{cases} d_{ij}^{-\alpha}, & if\ i \neq j \\ 0, & otherwise \end{cases}$$

where α is any positive parameter, and $d_{i,j}$ is the distance between regions i and j.

Table 2 presents the results of the Global Moran's I for the cyclical sensitivity of the LFP obtained with the HP method with λ=400.[20] For the period 1977–2015, the results show a positive spatial dependence with both sets of matrixes. The analysis of the sub-

[19] See O'Sullivan & Unwin (2010) for more detailed information about the Knn and ID matrixes.
[20] We also perform the same analysis putting a value equal to 0 in those provinces where we have obtained results of the cyclical sensitivities that are not statistically significant (no prevalence of either the AWE or the DWE over the other in these territories). The results are very similar to what we show in table 2. Detailed results are available from the authors upon request

periods indicates that, between 1977 and 1996, we only find a positive spatial dependence either when we consider less than three neighbors or when the distance is more penalized. From 1997 to 2015, there is once again a positive spatial dependence for all the matrixes, but it is weaker than in the case of the whole period.

Table 2. Global spatial dependence analysis (HP λ=400)

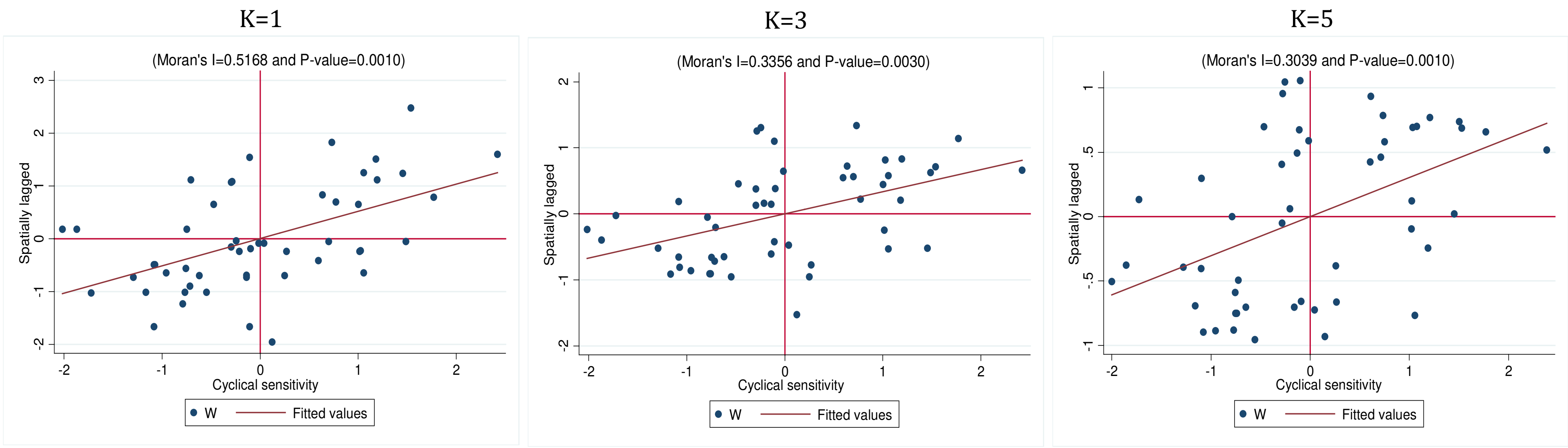
	1977–2015	1977–1996	1997–2015
Knn=1	0.517***	0.385**	0.398**
Knn=2	0.376***	0.196*	0.306***
Knn=3	0.336***	0.112	0.297***
Knn=4	0.344***	0.059	0.287***
Knn=5	0.303***	0.002	0.255***
Knn=6	0.277***	-0.015	0.259***
Knn=7	0.249***	0.003	0.218***
Knn=8	0.242***	0.003	0.228***
Knn=9	0.220***	-0.028	0.214***
Knn=10	0.203***	-0.048	0.193***
	1977–2015	**1977–1996**	**1997–2015**
ID (α=3)	0.299***	0.166**	0.238***
ID (α=2.75)	0.283***	0.144**	0.229***
ID (α=2.50)	0.265***	0.121**	0.219***
ID (α=2.25)	0.244***	0.098**	0.206***
ID (α=2)	0.220***	0.075*	0.190***
ID (α=1.75)	0.193***	0.053*	0.170***
ID (α=1.50)	0.163***	0.033	0.147***
ID (α=1.25)	0.130***	0.016	0.121***
ID (α=1)	0.098***	0.003	0.093***
ID (α=0.75)	0.065***	-0.007	0.064***

Notes: The values in the table refer to the Global Moran's I. The null hypothesis refers to the absence of spatial dependence. *, **, and *** show statistical significance at 10%, 5%, and 1% levels, respectively. **Source:** Own elaboration.

To test the robustness of our results, we perform the spatial analysis using the values obtained by the QT procedure and the HP filter with λ =100. In the case of the QT procedure, the results show positive spatial dependence both for the whole period and for the two sub-periods. This effect is stronger than before and occurs for the two sets of spatial matrices. If we use the HP filter with λ=100, the results are quite similar to those obtained with λ=400. The spatial dependence is present both for the entire period and for the two groups of matrixes. The analysis by sub-periods only shows spatial dependence between 1997 and 2015 and for some spatial matrixes. Figures 3 and 4 present the scatter plots of the Global Moran's I for the HP filter (λ=400), when three Knn matrixes (K=1, 3 and 5) and three ID matrixes (α=1, 2 and 3) are used. The spatial correlation shown in figures 3 and 4 is consistent with the interaction presented in figure 2 and allows us to confirm the presence of the BWE. This corroborates the existence of a "social effect", which causes that the cyclical sensitivity of the LFP in one territory is influenced by what happens in its neighboring regions.[21]

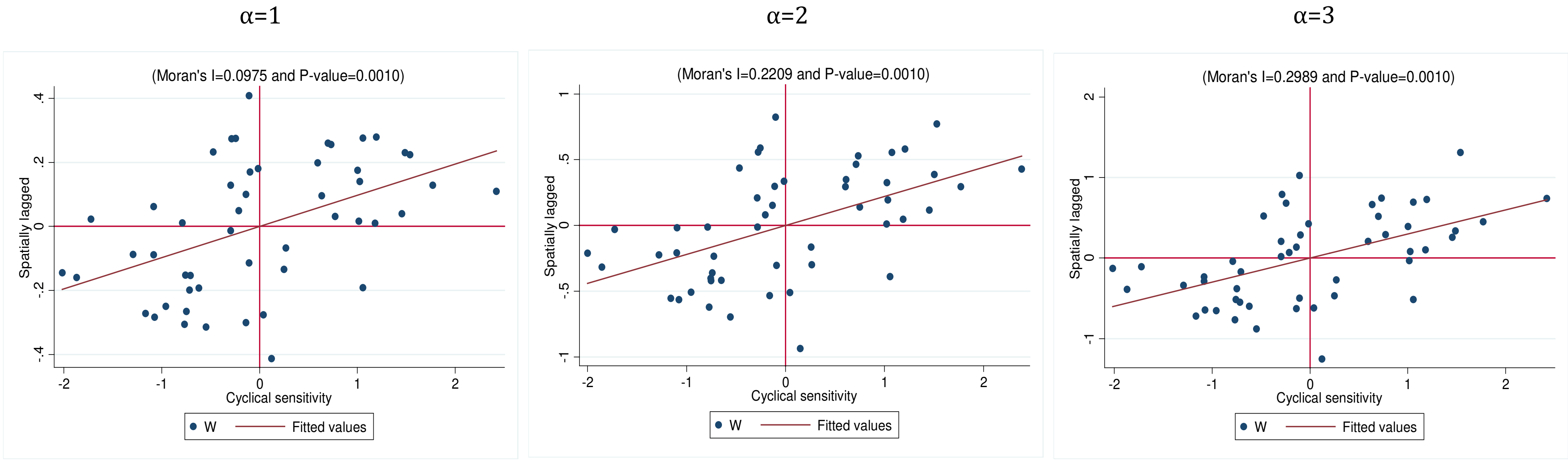
[21] Detailed results for the other spatial matrixes and the other two methods (QT procedure and HP (λ=100)) are available from the authors upon request.

Figure 3. Global Scatterplot diagrams of Moran's I (HP λ=400) (1997–2015)



Source: Own elaboration.

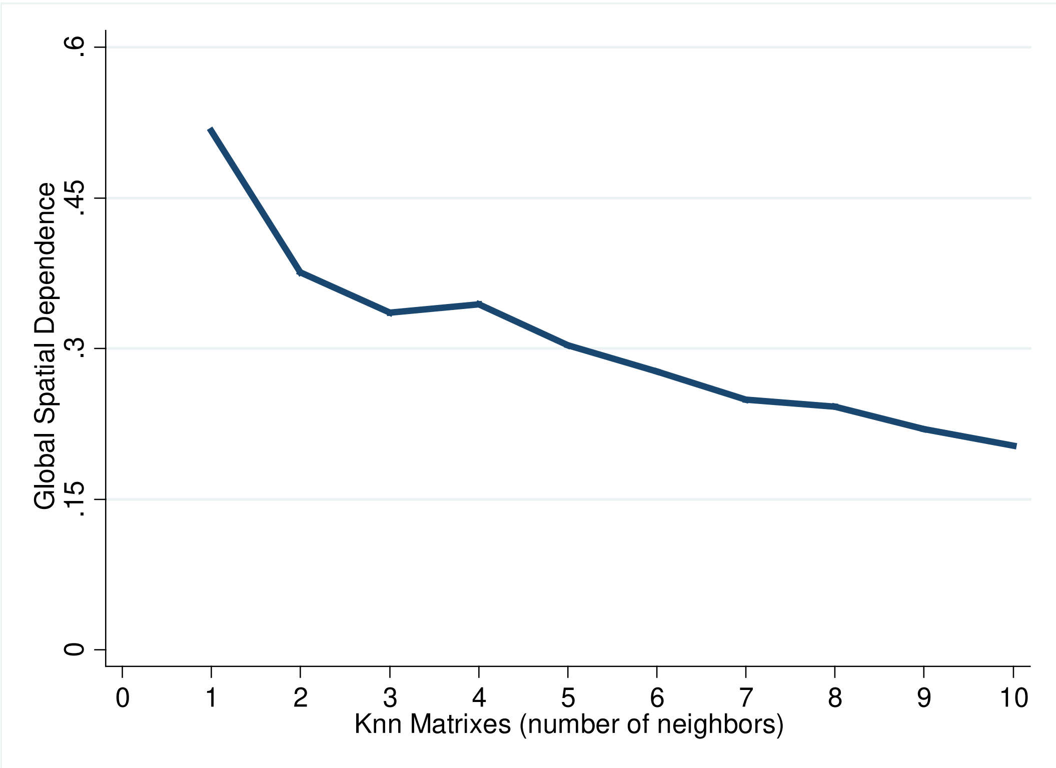
Figure 4. Global Scatterplot diagrams of Moran´s I (HP=400) (1997-2015)



Source: Own elaboration.

The next step in the spatial analysis is to study the evolution of the spatial dependence before changes in neighborhood parameters. As we explained before, each neighborhood criterion includes ten different levels. Depending on the spatial correlation in each level, it is possible to understand how the "social effect" works. The results in table 2 show that, as we increase the number of neighbors (or we reduce the α parameter), the spatial correlation coefficient decreases. To explain this point in more detail, figures 5 and 6 depict the evolution of the spatial correlation as the matrix parameters of the two sets change. The decreasing slope in both figures indicates that the BWE is caused by what happens in the nearest territories. As we increase the number of provinces that we consider "neighbors", the social effect tends to disappear.[22]

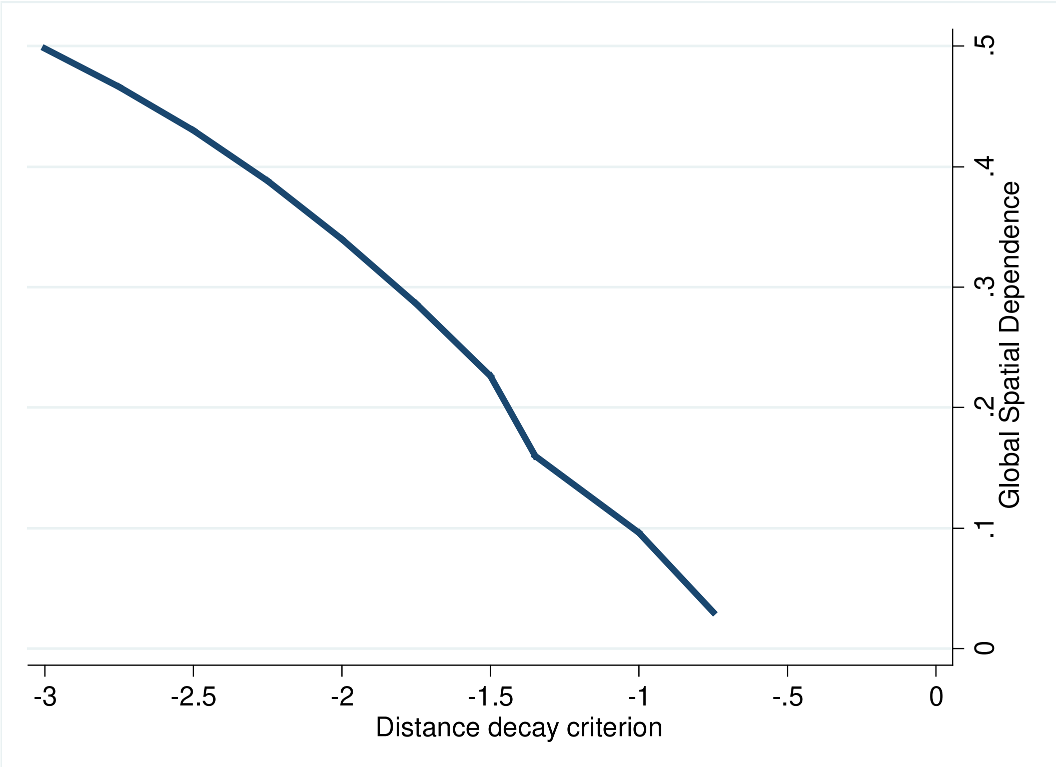
Figure 5. Evolution of the Global Spatial Dependence of the Knn matrixes (1977–2015) (HP λ=400)



Source: Own elaboration.

[22] Detailed results for the other two methods (QT procedure and HP with λ=100) are available from the authors upon request.

Figure 6. Evolution of the Global Spatial Dependence of the Inverse Distance matrixes (1977–2015) (HP λ=400)



Notes: Distance decay criterion is equal to the $-\alpha$ parameter of the equation that determines the spatial weights of the inverse distance matrix ($d_{ij}^{-\alpha}$). **Source:** Own elaboration.

5.3. Discussion and policy implications

Once we have offered empirical evidence of the existence of the BWE, in the following paragraphs we will comment on the economic policy implications that it generates. First of all, our results prove that local labor markets react differently to cyclical fluctuations. This means that the economic measures should be carried out while bearing in mind the territorial context, so the policy makers should not design economic policies that have the same intensity of effect in all the regions. In other words, different territories need specific policies that focus on the labor market dynamics of each territory.

Another important feature is that the regions cannot be studied in "isolation" from each other but interact with their neighbors. This also affects the performance of the policy makers in the regional labor markets. In this vein, the policies implemented should be pay more attention to the existence of "spatial areas" rather than "single spatial units" at the time of understanding the relationship between the labor market participation and the state of the business cycle. This means that the economic patterns that the labor force follows in any other territory are guided and conditioned by the behavior of its neighboring territories.

Finally, it is also necessary to take into account the "social effects" when analyzing the implications of the labor market policies. According to this**,** the implementation of macroeconomic policies (both fiscal and monetary) by the regional governments could cause "extra effects" beyond those initially expected. The actions of the regional governments at NUTS-2 level, could affect either other NUTS-2 territories or NUTS-3 units that do not belong to that region. This is especially relevant in the Spanish case, where the autonomous communities (NUTS-2) play a key role from an economic and political point of view, and the Spanish provinces (NUTS-3) have a limited capacity to act.[23]

6. Conclusions

The key issue of this paper is to test whether the relationship between the business cycle and LFP in any given area may be affected by the behavior of its neighbors. To do that, we first elaborate a microeconomic decision model to conceptualize the AWE and the DWE. In a second stage, by means of an aggregation process, we incorporate the BWE as a social effect. Finally, we use spatial econometrics techniques to test for the existence of the BWE in Spanish local labor markets.

The first part of this work studies the cyclical sensitiveness of the LFP, employing a panel dataset composed of the fifty Spanish provinces during the period 1977–2015. Also, due to the length of the period of study, we extend our analysis to two sub-periods (1977–1996 and 1997–2015). Regardless of the method used to obtain the cyclical components of the variables (HP with $\lambda = 400$, HP with $\lambda = 100$, or QT), we can conclude that the DWE dominates in most of the territories and periods where the coefficients are significant.

As our theoretical model shows, the cyclical sensitivity of the LFP in one area will be influenced by the behavior of its neighbors. To study that, after carrying out a macroeconomic aggregation process, we coined the BWE and tested it with standard spatial econometric techniques that we have derived directly from our theoretical discussion. Using different neighborhood criteria, the results reveal the presence of a positive global spatial dependence in the cyclical sensitivity of the LFP in the Spanish local labor markets. This is consistent with what we illustrate in our theoretical framework and verifies the existence of the BWE. Finally, the empirical analysis shows that the intensity of the BWE is not “linear”, i.e. as we fix a laxer neighborhood criterion, the strength of the BWE decreases.

Our work posits some interesting economic policy implications that affect the outcome of the regional labor markets. First of all, policy makers should bear in mind that the regions do not all react in the same way to the economic shocks of the business cycle. Thus, the policies should to be applied while taking into account the economic dynamics of each zone, since the application of an economic policy with the same intensity for all the regions could lead to heterogeneous results. Another important issue is that the territories interact with their neighbors, so they are not fully “independent” of each other. In this way, the policy makers should focus their actions on spatial areas, instead of spatial units, due to the existence of spillover effects among the territories that might condition the outcome of the economic policies. To conclude, we can say that our work corroborates the idea that “social effects” play a key role in carrying out labor market policies. This implies that these phenomena could generate some kinds of effects that are not initially planned and that affect the economic dynamics of neighboring areas, even when the neighbors do not belong to the same territorial administration.

[23] The Spanish NUTS-2 (Autonomous Communities) represented approximately 30% of public expenditure in Spain during 2015 and 2016. For their part, NUTS-3 units (Provinces) covered approximately 11% of public spending in Spain during those same years (OECD, 2017).

References

Backus, D. K., & Kehoe, P. J., 1992. International evidence on the historical properties of business cycles. The American Economic Review, 82(4), 864-888.

Baxter, M., & King, R. G., 1999. Measuring business cycles: Approximate band-pass filters for economic time series. The Review of Economics and Statistics, 81(4), 575-593.

Benati, L., 2001. Some empirical evidence on the 'discouraged worker'effect. Economics Letters, 70(3), 387-395.

Blanchard, O. J., & Katz, L. F., 1992. Regional evolutions. Brookings Papers on Economic Activity, 1992(1), 1-75.

Blomquist, N. S., 1993. Interdependent behavior and the effect of taxes. Journal of Public Economics, 51(2), 211-218.

Boeri, T., & van Ours, J., 2013. The economics of imperfect labor markets. Princeton University Press.

Cahuc, P., & Zylberberg, A., 2004. Labor economics. MIT press.

Cahuc, P., Carcillo, S., & Zylberberg, A., 2014. Labor economics. MIT press.

Casella, A., & Hanaki, N., 2008. Information channels in labor markets: On the resilience of referral hiring. Journal of Economic Behavior & Organization, 66(3-4), 492-513.

Clark, K. B., & Summers, L. H., 1982. Labour force participation: timing and persistence. The Review of Economic Studies, 49(5), 825-844.

Clark, K. B., & Summers, L. H., 1981. Demographic differences in cyclical employment variation. The Journal of Human Resources, 16, 61-79.

Cliff, A.D., & Ord, J.K., 1981. Spatial Processes: Models & applications. Taylor & Francis.

Collewet, M., de Grip, A., & de Koning, J., 2017. Conspicuous work: Peer working time, labour supply, and happiness. Journal of Behavioral and Experimental Economics, 68, 79-90.

Congregado, E., Carmona, M., Golpe, A. A., & Van Stel, A., 2014. Unemployment, gender and labor force participation in Spain: Future trends in labor market. Journal for Economic Forecasting, 17(1), 53-66.

Congregado, E., Golpe, A. A., & Van Stel, A., 2011. Exploring the big jump in the Spanish unemployment rate: Evidence on an 'added-worker'effect. Economic Modelling, 28(3), 1099-1105.

Cracolici, M. F., Cuffaro, M., & Nijkamp, P., 2007. Geographical distribution of unemployment: An analysis of provincial differences in Italy. Growth and Change, 38(4), 649-670.

Darby, J., Hart, R. A., & Vecchi, M., 2001. Labour force participation and the business cycle: A comparative analysis of France, Japan, Sweden and the United States. Japan and the World Economy, 13(2), 113-133.

Decressin, J., & Fatas, A., 1995. Regional labor market dynamics in Europe.European Economic Review, 39(9), 1627-1655.

Del Boca, D., Locatelli, M., & Pasqua, S., 2000. Employment decisions of married women: Evidence and explanations. Labour, 14(1), 35-52.

Dietz, R. D., 2002. The estimation of neighborhood effects in the social sciences: An interdisciplinary approach. Social Science Research, 31(4), 539-575.

Emerson, J., 2011. Unemployment and labor force participation in the United States. Economics Letters, 111(3), 203-206.

Filiztekin, A., 2009. Regional unemployment in Turkey. Papers in Regional Science, 88(4), 863-878.

Gałecka-Burdziak, E., & Pater, R., 2016. Discouraged or added worker effect: Which one prevails in the Polish labour market? Acta Oeconomica, 66(3), 489-505.

Ghignoni, E., & Verashchagina, A., 2016. Added worker effect during the Great Recession: Evidence from Italy. International Journal of Manpower, 37(8), 1264-1285.

Granovetter, M., & Soong, R., 1986. Threshold models of interpersonal effects in consumer demand. Journal of Economic Behavior & Organization, 7(1), 83-99
Grodner, A., & Kniesner, T. J., 2008. Labor supply with social interactions: Econometric estimates and their tax policy implications. In: Polachek, W. S., Tatsiramos, K., (Eds). Work, Earnings and Other Aspects of the Employment Relation Emerald Group Publishing Limited, 1-23.
Grodner, A., & Kniesner, T. J., 2006. Social interactions in labor supply. Journal of the European Economic Association, 4(6), 1226-1248.
Halleck Vega, S., & Elhorst, J. P., 2017. Regional labour force participation across the European Union: A time–space recursive modelling approach with endogenous regressors. Spatial Economic Analysis, 12(2-3), 138-160.
Halleck-Vega, S., & Elhorst, J. P., 2014. Modelling regional labour market dynamics in space and time. Papers in Regional Science, 93(4), 819-841.
Haller, P., & Heuermann, D. F., 2016. Job search and hiring in local labor markets: Spillovers in regional matching functions. Regional Science and Urban Economics, 60, 125-138.
Hodrick, R. J., & Prescott, E. C., 1997. Postwar US business cycles: An empirical investigation. Journal of Money, Credit, and Banking, 29(1) 1-16.
Humphrey, D. D., 1940. Alleged" additional workers" in the measurement of unemployment. The Journal of Political Economy, 48(3), 412-419.
Jimeno, J. F., & Bentolila, S., 1998. Regional unemployment persistence (Spain, 1976–1994). Labour Economics, 5(1), 25-51.
Kapteyn, A. J., & Woittiez, I. B., 1987. Preference interdependence and habit formation in family labor supply. Tilburg University, Department of Economics.
King, R. G., & Rebelo, S., 1993. Low Frequency Filtering and Real Business Cycles. Journal of Economic Dynamics and Control, 17 (1-2), 207-231.
Kondo, K., 2015. Spatial persistence of Japanese unemployment rates. Japan and the World Economy, 36, 113-122.
Koursaros, D., 2017. Labor market dynamics when (un) employment is a social norm. Journal of Economic Behavior & Organization, 134, 96-116.
Leibenstein, H., 1950. Bandwagon, snob, and Veblen effects in the theory of consumers' demand. The Quarterly Journal of Economics, 64(2), 183-207.
Lenten, L. J., 2001. The profile of labour force discouragement in Australia. Australian Journal of Labour Economics, 4(1), 3-17.
Leppel, K., & Clain, S. H., 1995. The effect of increases in the level of unemployement on older workers. Applied Economics, 27(10), 901-906.
Lippman, S. A., & McCall, J. J., 1976a. The Economics of Job Search: A Survey: Part I. Economic Inquiry, 14(2), 155-189.
Lippman, S. A., & McCall, J. J., 1976b. The Economics of Job Search: A Survey: Part II. Economic Inquiry, 14(2), 347–368.
Long, C. D., 1958. The Labor Force in Severe Depressions. In: Long, C. D., (Eds). The Labor Force Under Changing Income and Employment. Princeton University Press, 181-201.
Long, C. D., 1953. Impact of effective demand on the labor supply. The American Economic Review, 43(2), 458-467.
Loog, B., 2013. Interdependent preferences in labor supply. Maastricht University Working Paper.
López-Bazo, E., Barrio, T. D., & Artís, M., 2005. Geographical distribution of unemployment in Spain. Regional Studies, 39(3), 305-318.
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.
Maloney, T., 1987. Employment constraints and the labor supply of married women: A reexamination of the added worker effect. Journal of Human Resources,22(1), 51-61.

Manski, C. F., 2000. Economic analysis of social interactions. Journal of Economic Perspectives, 14(3), 115-136.
Manski, C. F., 1993. Identification of endogenous social effects: The reflection problem. The Review of Economic Studies, 60(3), 531-542.
Maravall, A., & Del Río, A., 2001. Time aggregation and the Hodrick-Prescott filter (No. 0108). Banco de España.
Marston, S. T., 1985. Two views of the geographic distribution of unemployment. The Quarterly Journal of Economics, 100(1), 57-79.
Martín-Román, Á., Moral, A., & Martínez-Matute, M., 2015. Peer effects in judicial decisions: Evidence from Spanish labour courts. International Review of Law and Economics, 42, 20-37.
Martin-Roman, A., 2014. Working time reductions and labour force participation in unemployment contexts: a note. Theoretical Economics Letters, 4(3), 174-182.
Martín-Román, Á. L., & Moral de Blas, A., 2002. Oferta de trabajo y desempleo en Europa: El caso de las mujeres. Revista de Estudios Europeos, 30, 23-41
Maurin, E., & Moschion, J., 2009. The social multiplier and labor market participation of mothers. American Economic Journal: Applied Economics, 1(1), 251-72.
McCall, J. J., 1970. Economics of information and job search. Quarterly Journal of Economics, 84(1), 113-126.
Mincer, J., 1962. Labor force participation of married women: A study of labor supply. In: Universities-National Bureau Committee for Economic Research (Eds). Aspects of labor economics. Princeton University Press, 63-106.
Molho, I., 1995. Spatial autocorrelation in British unemployment. Journal of Regional Science, 35(4), 641-658.
Möller, J. & Aldashev, A., 2006. Interregional differences in labor market participation. Review of Regional Research, 26(1), 25-50.
Moran, P., 1948. The interpretation of spatial maps. Journal of the Royal Statistical Society B, 10(2), 243-251.
Moreno, R., & Vayá, E., 2002. Econometría espacial. Nuevas técnicas para el análisis regional. Una aplicación a las regiones europeas. Investigaciones Regionales, 1, 83-106.
Mortensen, D. T., & Pissarides, C. A., 1999. New developments in models of search in the labor market. In: Ashenfelter, C. O., Card, D. (Eds). Handbook of Labor Economics, Vol. III, Amsterdam: North Holland, 2567-2627.
Mortensen, D. T., 1986. Job search and labor market analysis. In: Ashenfelter, C. O., Layard, R. (Eds). Handbook of Labor Economics, Vol. II, Amsterdam: North Holland, 849-919.
Mortensen, D. T., 1970. Job search, the duration of unemployment, and the Phillips curve. American Economic Review, 60(5), 847-862.
Neumark, D., & Postlewaite, A., 1998. Relative income concerns and the rise in married women's employment. Journal of public Economics, 70(1), 157-183.
O'Brien, M., 2011. Discouraged older male workers and the discouraged worker effect. Australian Journal of Labour Economics, 14(3), 217.
OECD (2017). Government at a Glance 2017. Paris: OECD Publishing.
O'Sullivan, D., & Unwin, D. J., 2010. Geographic Information Analysis and Spatial Data.In: O'Sullivan, D., & Unwin, D. J. (Eds). Geographic Information Analysis, John Wiley & Sons Ltd, 1-32.
Österholm, P., 2010. Unemployment and labour-force participation in Sweden. Economics Letters, 106(3), 205-208.
Overman, H. G., & Puga, D., 2002. Unemployment clusters across Europe's regions and countries. Economic Policy, 17(34), 115-148.
Parker, S. W., & Skoufias, E., 2004. The added worker effect over the business cycle: Evidence from urban Mexico. Applied Economics Letters, 11(10), 625-630.

Pollak, R. A., 1976. Interdependent preferences. The American Economic Review, 66(3), 309-320.
Prieto-Rodríguez, J., & Rodríguez-Gutiérrez, C., 2003. Participation of married women in the European labor markets and the "added worker effect". The Journal of Socio-Economics, 32(4), 429-446.
Prieto-Rodríguez, J., & Rodríguez-Gutiérrez, C., 2000. The added worker effect in the Spanish case. Applied Economics, 32(15), 1917-1925.
Romme, A. G. L., 1990. Projecting female labor supply: The relevance of social norm change. Journal of Economic Psychology, 11(1), 85-99.
Tano, D. K., 1993. The added worker effect: A causality test. Economics Letters, 43(1), 111-117.
Tassier, T., & Menczer, F., 2008. Social network structure, segregation, and equality in a labor market with referral hiring. Journal of Economic Behavior & Organization, 66(3-4), 514-528.
Tatsiramos, K., & van Ours, J. C., 2014. Labor market effects of unemployment insurance design. Journal of Economic Surveys, 28(2), 284-311.
Tatsiramos, K., & van Ours, J., 2012. Labor market effects of unemployment insurance design. Discussion Paper Series No. 6950. Institute for the Study of Labor (IZA).
Taylor, J., & Bradley, S., 1997. Unemployment in Europe: A comparative analysis of regional disparities in Germany, Italy and the UK. Kyklos, 50(2), 221-245.
Van Herpen, E., Pieters, R., & Zeelenberg, M., 2009. When demand accelerates demand: Trailing the bandwagon. Journal of Consumer Psychology, 19(3), 302-312.
Vendrik, M. C., 2003. Dynamics of a household norm in female labour supply. Journal of Economic Dynamics and Control, 27(5), 823-841.
Vendrik, M. C., 1998. Unstable bandwagon and habit effects on labor supply. Journal of Economic Behavior & Organization,36(2), 235-255.
Wachter, M. L., 1974. A new approach to the equilibrium labour force. Economica, 41(161), 35-51.
Wachter, M. L., 1972. A labor supply model for secondary workers. The Review of Economics and Statistics, 54(2), 141-151.
Weinberg, B. A., Reagan, P. B., & Yankow, J. J., 2004. Do neighborhoods affect hours worked? Evidence from longitudinal data. Journal of Labor Economics, 22(4), 891-924.
Woittiez, I., & Kapteyn, A., 1998. Social interactions and habit formation in a model of female labour supply. Journal of Public Economics, 70(2), 185-205.
Woytinsky, W. S., 1940. Additional workers on the labor market in depressions: A reply to Mr. Humphrey. Journal of Political Economy, 48(5), 735-739

Appendix

Table A1. Unit-Root tests

	HP (λ=400)		QT		HP (λ=100)	
	CPR	CUR	CPR	CUR	CPR	CUR
IPS	-11.930***	-6.254***	-6.330***	-1.817**	-15.745***	-9.008***
LLC	-9.812***	-12.947***	-1.694**	-5.787***	-16.330***	-16.402***
HT	0.551***	0.756***	0.705***	0.872***	0.647***	-14.723***
B	-10.121***	-9.917***	-5.945***	-2.891***	-14.391***	-4.387***

Notes: "IPS" is the W-t-bar statistic for Im–Pesaran–Shin unit-root test (panel-specific AR parameter, panel means included and without time trend); "LLC" refers to the bias-adjusted t statistic for Levin–Lin–Chu unit-root test (1 lag in the ADF); "HT" is the rho statistic for the Harris–Tzavalis test (common AR parameter, panel means included and without time trend) and finally, "B" refers to lambda statistic for the Breitung unit-root test (common AR parameter, panel means included, and without time trend). ***, **, and * show statistical significance at 1%, 5%, and 10% levels, respectively. **Source:** Own elaboration.

Table A2. Descriptive statistics

	Variables	Periods	Mean	Std Dev	Min	Max
HP (λ=400)	CPR	1977-2015	4.98e-10	1.277	-5.539	3.967
		1977-1996	-4.98e-10	1.170	-3.960	3.774
		1997-2015	4.57e-10	1.258	-5.561	3.610
	CUR	1977-2015	2.07e-09	3.451	-11.377	9.376
		1977-1996	1.31e-09	2.576	-7.987	10.234
		1997-2015	1.17e-09	3.851	-10.698	10.000
QT	CPR	1977-2015	-5.93e-09	1.590	-6.263	5.500
		1977-1996	-0.120	1.380	-3.972	4.806
		1997-2015	0.126	1.776	-6.263	5.500
	CUR	1977-2015	-9.39e-09	5.426	-16.482	13.693
		1977-1996	1.528	4.283	-12.300	12.359
		1997-2015	-1.608	6.008	-16.482	13.693
HP (λ=100)	CPR	1977-2015	1.56e-08	1.080	-5.374	3.348
		1977-1996	0.009	1.068	-3.831	3.348
		1997-2015	-0.010	1.093	-5.374	3.227
	CUR	1977-2015	-1.01e-07	2.693	-9.784	8.980
		1977-1996	0.239	2.447	-8.003	8.980
		1997-2015	-0.251	2.909	-9.784	7.708

Notes: "CPR" is the cyclical component of the PR. "CUR" is the cyclical component of the unemployment rate. **Source:** Own elaboration.

Table A3. Cyclical sensitivity of the labor force participation (QT procedure and HP λ=100)

	QT			HP=100		
	1977–2015	1977–1996	1997–2015	1977–2015	1977–1996	1997–2015
Alava	-0.286***	-0.342***	-0.257***	-0.013	-0.186	0.175
Albacete	0.003	-0.001	-0.002	0.025	-0.012	0.048
Alicante	-0.045	-0.071	-0.041	-0.108*	-0.292***	0.020
Almeria	-0.177***	-0.263***	-0.153***	-0.067	-0.427***	0.042
Asturias	-0.011	0.096	-0.055	0.055	0.015	0.083
Avila	0.015	0.055	0.003	0.062	0.064	0.070
Badajoz	-0.063*	-0.152***	-0.020	0.020	-0.110	0.150*
Balearic Islands	-0.159***	-0.232***	-0.129*	0.011	-0.135	0.101
Barcelona	-0.125***	-0.082*	-0.182***	-0.009	-0.033	0.030
Burgos	-0.220***	-0.179**	-0.245***	-0.084	-0.119	-0.035
Caceres	0.087**	0.036	0.105**	0.138***	-0.094	0.200***
Cadiz	-0.013	-0.024	-0.006	0.068	0.089	0.060
Cantabria	-0.196***	-0.138*	-0.231***	-0.113	-0.111	-0.109
Castellon de la Plana	-0.179***	-0.188**	-0.189***	-0.119**	-0.277***	-0.046
Ciudad Real	-0.101**	-0.086	-0.109*	-0.027	-0.064	0.021
Cordoba	-0.017	-0.068	0.001	0.033	-0.167**	0.142**
Corunna (A)	-0.005	0.289***	-0.149*	0.239***	0.439***	0.039
Cuenca	-0.038	-0.043	-0.040	-0.032	-0.205	0.030
Girona	-0.334***	-0.442***	-0.285***	-0.220***	-0.415***	-0.075
Granada	-0.025	-0.085	-0.004	0.006	-0.154*	0.087
Guadalajara	-0.204***	-0.167***	-0.239***	-0.130*	-0.250***	0.009
Guipuzcoa	-0.251***	-0.193***	-0.311***	-0.089	-0.037	-0.216
Huelva	0.050	-0.014	0.078*	0.100**	-0.129*	0.260*
Huesca	-0.215***	-0.083	-0.305***	-0.001	0.076	-0.057
Jaen	0.012	-0.068	0.051	0.020	-0.080	0.142**
Leon	0.001	0.037	-0.016	0.034	-0.173	0.126
Lleida	-0.326***	-0.118	-0.405***	-0.053	0.040	-0.100
Lugo	0.143**	0.326**	0.106	0.154	0.523***	0.024

Table A3(continuation)

	1977–2015	1977–1996	1997–2015	1977–2015	1977–1996	1997–2015
Madrid	-0.242***	-0.132**	-0.321***	-0.071	-0.058	-0.082
Malaga	0.047	0.063	0.033	0.026	0.003	0.043
Murcia	-0.146***	-0.194***	-0.138***	-0.056	-0.219**	0.055
Navarre	-0.286***	-0.193***	-0.388***	-0.110	-0.142	-0.060
Orense	-0.074	-0.403***	-0.013	-0.088	-0.671***	0.050
Palencia	0.094**	0.048	0.107*	0.049	-0.035	0.207*
Palmas (Las)	-0.098***	-0.085*	-0.112**	-0.099**	-0.438***	0.035
Pontevedra	-0.191***	-0.121	-0.215***	-0.001	0.105	-0.047
Rioja (La)	-0.272***	-0.218***	-0.325***	-0.092	-0.129	-0.043
Salamanca	-0.032	-0.052	-0.015	0.118*	0.095	0.144
S C Tenerife	-0.025	-0.019	-0.039	0.064	0.098	0.044
Segovia	-0.121*	0.022	-0.233**	-0.050	0.007	-0.107
Seville	-0.093***	-0.065	-0.107**	-0.043	-0.029	-0.046
Soria	-0.275***	-0.441***	-0.187*	-0.050	-0.458**	0.153
Tarragona	-0.253***	-0.307***	-0.224***	-0.229***	-0.397***	-0.049
Teruel	-0.102*	-0.059	-0.140*	-0.157*	-0.122	-0.202
Toledo	-0.169***	-0.227***	-0.142**	-0.022	-0.194*	0.079
Valencia	-0.172***	-0.147***	-0.197***	-0.049	-0.042	-0.060
Valladolid	-0.212***	-0.283***	-0.183***	-0.236***	-0.428***	-0.061
Vizcaya	-0.145***	-0.088	-0.194***	-0.072	-0.058	-0.095
Zamora	-0.115***	0.019	-0.183***	-0.183**	-0.093	-0.218**
Saragossa	-0.110**	-0.109	-0.129**	-0.023	-0.053	0.015

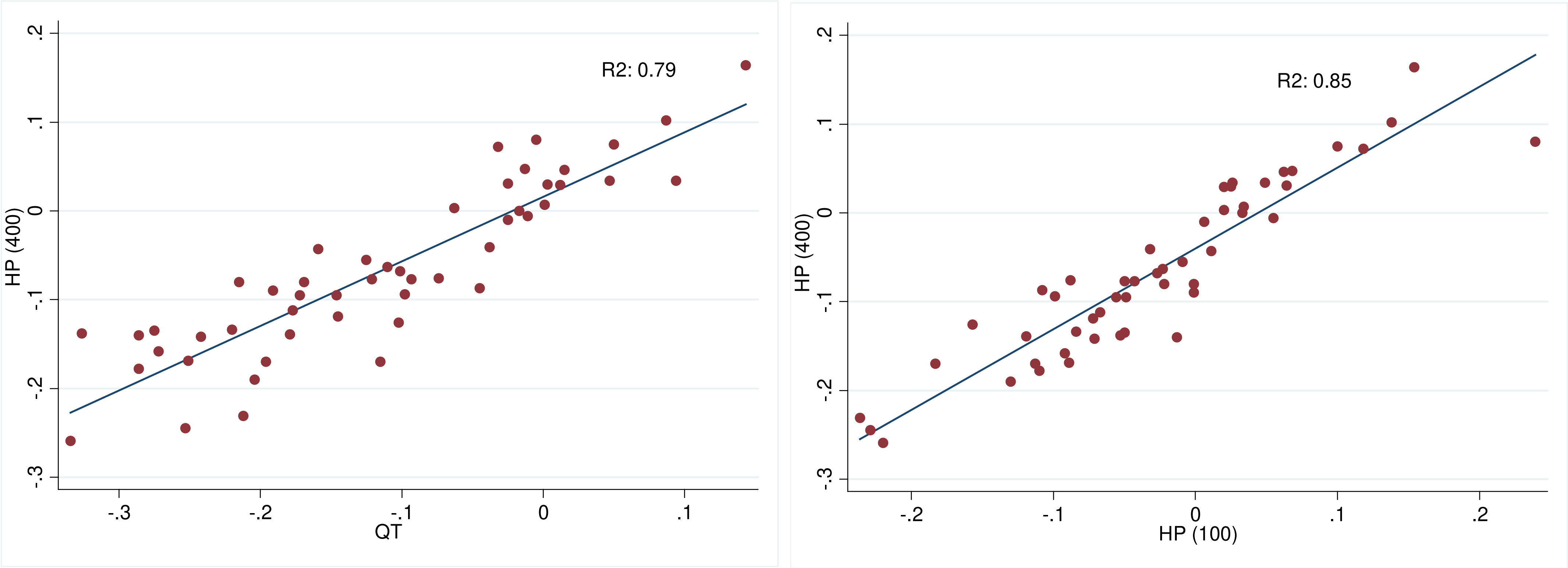
*, **, and *** show s statistical significance at 10%, 5%, and 1% levels, respectively. **Source:** Own elaboration.

Table A4. Global spatial dependence analysis (QT procedure and HP λ=100)

	QT			HP (λ=100)		
	1977–2015	**1977–1996**	**1997–2015**	**1977–2015**	**1977–1996**	**1997–2015**
Knn=1	0.379**	0.346**	0.401**	0.511***	0.194	0.246
Knn=2	0.453***	0.235**	0.488***	0.290**	0.091	0.125
Knn=3	0.445***	0.164*	0.502***	0.223**	0.030	0.119
Knn=4	0.425***	0.126*	0.476***	0.268***	-0.006	0.123
Knn=5	0.408***	0.115*	0.446***	0.214***	-0.050	0.087
Knn=6	0.405***	0.105*	0.449***	0.155**	-0.054	0.100*
Knn=7	0.349***	0.110**	0.381***	0.154***	-0.025	0.084
Knn=8	0.355***	0.122**	0.386***	0.140***	-0.014	0.111**
Knn=9	0.332***	0.099**	0.364***	0.108**	-0.049	0.094**
Knn=10	0.315***	0.099**	0.342***	0.093**	-0.050	0.082**
	1977–2015	**1977–1996**	**1997–2015**	**1977–2015**	**1977–1996**	**1997–2015**
ID (α=3)	0.342***	0.195***	0.372***	0.241***	0.074	0.100
ID (α=2.75)	0.330***	0.178***	0.360***	0.223***	0.065	0.093
ID (α=2.50)	0.314***	0.161***	0.345***	0.203***	0.055	0.087
ID (α=2.25)	0.295***	0.142***	0.324***	0.181***	0.044	0.080*
ID (α=2)	0.270***	0.121***	0.299***	0.158***	0.033	0.072*
ID (α=1.75)	0.240***	0.100***	0.268***	0.133***	0.021	0.063*
ID (α=1.50)	0.206***	0.078***	0.232***	0.107***	0.011	0.053**
ID (α=1.25)	0.168***	0.056***	0.191***	0.081***	0.001	0.043**
ID (α=1)	0.128***	0.037**	0.147***	0.057***	-0.006	0.031**
ID (α=0.75)	0.087***	0.019***	0.103***	0.034***	-0.012	0.018***

Notes: The values in the table refer to the Global Moran´s I. The null hypothesis refers to the absence of spatial dependence. *, **, and *** show statistical significance at 10%, 5%, and 1% levels, respectively. **Source:** Own elaboration

Figure A1. Scatterplot diagrams of the relationship between the cyclical sensitivities obtained by the HP method (λ=400), HP method (λ=100) and the QT procedure.



Source: Own elaboration.