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SHIFTS IN THE BEVERIDGE CURVE IN SPAIN AND THEIR MACROECONOMIC EFFECTS*

JOSÉ E. BOSCÁ
University of Valencia, FEDEA
RAFAEL DOMÉNECH
University of Valencia, BBVA Research
JAVIER FERRI
University of Valencia, FEDEA
JOSÉ R. GARCÍA
University of Valencia

In this article, we construct a homogeneous series of vacancies for the Spanish economy from 1980 to 2016, which enables us to perform an analysis of the effects of the economic cycle on the relationship between unemployment and vacancies. The methodology proposes a link between the old series of vacancies from the former INEM (National Employment Institute) and the new series from Eurostat. To that end, we use the information from the Short-Term Labour Survey. An analysis of this new homogeneous series shows that the Beveridge curve shifted between 2008 and 2009 due to the worse efficiency of the process of matching vacancies and unemployed workers. A simulation of the macroeconomic effects of this fall in efficiency in a general equilibrium model for Spain generates movements in GDP and employment in the same direction as those actually observed in the crisis, albeit of lesser magnitude. The evidence offered shows that since 2014, the Beveridge curve has gradually been recovering its pre-crisis position, with a consequent decline in the unemployment rate.

Key words: vacancies, unemployment, Beveridge curve.
JEL classification: E24, J63, J64.

The high rate of unemployment in Spain is the main problem afflicting the Spanish economy and is an international anomaly. Together with low labour productivity, it almost entirely explains the gap between Spain and the main advanced economies in per capita income and wellbeing [see Andrés and Doménech (2015)]. Despite unemployment being a chronic problem since the beginning of the 1980s, until recently there was a surprising lack of certain basic sta-

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tistics with which to study this issue. Only in the first four months of 2014 did the INE (National Statistics Institute) start to publish information on the gross flows of workers among different states of employment, unemployment and inactivity, in the Labour Force Survey. While the INE has done commendable work in estimating these series backwards, we do not have information on these gross flows prior to 2005, although they can be approximated by means of probabilities of transition, as done by Estrada, García-Perea and Izquierdo (2004).

A similar situation applies to data on vacancies. Depending on the period, there is information from the INEM (from 1975 to 2005), from the Short-Term Labour Survey (from 2001 to 2012) and from Eurostat (from 2010 onwards). We do not, however, have a homogeneous series of vacancies covering the different economic cycles, which would allow us to analyse their relationship to the unemployment rate over a sufficiently long timeframe. This is particularly relevant to analyses of the economic expansion that took place from the second half of the 1990s, the recession after 2008 and the recovery that started in 2014.

This lack of a homogeneous series of vacancies covering an extended period has limited the analysis in the Spanish economy of the relationship between vacancy and unemployment rates, which gives rise to the Beveridge curve [see Beveridge (1945) or Pissarides (2000)]. Since there is not a sufficiently long, homogeneous series of vacancies, some studies for OECD economies [e.g., Bova, Jalles and Kolerus (2017)] do not include Spain in the sample of countries analysed, despite its high unemployment rate making it a natural and especially interesting focus of study.

The first studies to analyse the series of vacancies used the data provided by the INEM up to 2005. For example, Castillo, Jimeno and Licandro (1998) used the pending job offers handled by the INEM. Antolín (1994 and 1999) proposed a correction (by means of rescaling or elevation) to take account of job matches reported directly by firms and not counted as vacancies in the administration's data. This corrected series of vacancies was used by Dolado and Gómez (1997) and Fonseca and Muñoz (2003). Alvarez de Toledo, Núñez and Usabiaga (2008) used the series of vacancies handled and reported by the INEM up to 2005, with a correction for the competence transfer from the INEM to the Catalan Employment Service between 1998 and 1999. For his part, Bouvet (2012) made direct use of the INEM's series of vacancies published by the OECD up to 2004 at national level, and those provided by Antolín (1999), up to 2003 at regional level.

More recent articles have used other statistical sources, focusing their analyses on what happened in the crisis that started in 2008. For example, Hobijn and Sahin (2013) analyse the shifts in the Beveridge curve during the last recession using Eurostat data, which they also compare with those of INEM, albeit without linking the two sources. Dolado and Felgueroso (2012) and Villaverde, Maza and Hierro (2015) use the data from the Short-Term Labour Survey (STLS) up to the third quarter of 2011, while Bentolila *et al* (2012) link the data of Bouvet (2012) with those of the STLS. In an alternative approach, Arpaia *et al* (2014) use the series of vacancies published by Eurostat, which they extend backwards with the European Commission Business Survey variable "factors limiting production: labour". Indeed, Haincourt and Mogliani (2012) and Bonthuis *et al* (2016) use this perception series in their study of the shifts in the Beveridge curve for European countries –including Spain– during the last crisis.

In this article, we construct a homogeneous series of vacancies, which also include jobs offered by the public sector, from the first quarter of 1980 to the end of

2016. The method proposed is based on linking the INEM series that runs up to the first quarter of 2005, with the Eurostat series from 2010, using the information from the STLS between the second quarter of 2005 and the fourth quarter of 2009. The link thus has the advantage that it can be updated with each new set of data published by Eurostat. The series resulting from this link is corrected for seasonality and atypical values such as those pointed out by Alvarez de Toledo, Núñez and Usabiaga (2008).

This homogeneous series of vacancies offers valuable information about the effects of the economic cycle on the labour market. The resulting Beveridge curve remains relatively steady between the first quarter of 1994 and the first half of 2008, with an average unemployment rate during that period of 14.25% and a vacancy rate of 0.41%. From 2008 until mid-2009, the Beveridge curve shifts away from the origin. Our estimates indicate that this movement is consistent with an increase in the unemployment rate. However, between 2014 and 2016 the Beveridge curve again starts to move towards its pre-crisis position, with a consequent decline in unemployment. Although the sectoral reallocation does not appear to have had permanent effects on the unemployment rate, thus ruling out full hysteresis, its effects have been long-lasting and persistent over time.

The Labour Force Flows Statistics (EFPA in the Spanish abbreviation) produced by the INE allow us to calibrate the magnitude of these shifts in the Beveridge curve. Using the Rational Expectations Model for the Spanish Economy, REMS [see Boscá *et al*. (2010) and (2011)] it is then possible to simulate their effects on the Spanish economy. Our results show that, although these effects do not entirely explain the dynamic observed in the main macroeconomic aggregates (also affected by the movement along the Beveridge curve), they do explain it in part and are consistent with the evidence. Specifically, the shift in the Beveridge curve might explain up to 31% of the fall in employment and 55% of the fall in GDP in the most severe phase of the crisis.

The structure of this article is as follows. In the second section, we describe the vacancy data sources used. The third section describes the methodology used to obtain a homogeneous series of vacancies. In the fourth section, we analyse the relationship between vacancy and unemployment rates, and estimate the shifts in the Beveridge curve over the past few decades with the help of the Labour Force Flows Statistics. Section 5 assesses the macroeconomic effects of these shifts in the Beveridge curve during the crisis that started in 2008 and the subsequent economic recovery. The last section presents the main conclusions of this paper.

1. Description of the data

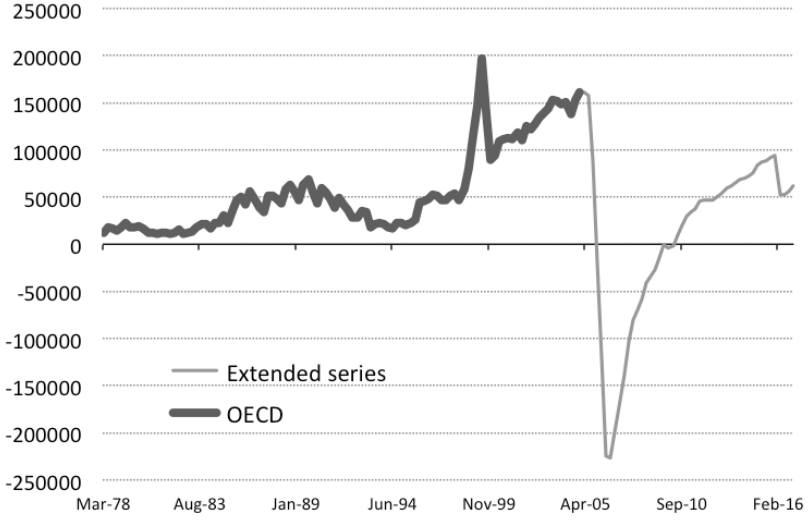
From the first quarter of 1977 until the first quarter of 2005, the OECD published the quarterly Unfilled Job Vacancies series for Spain (hereinafter v_t^{OECD}). The data were obtained from the monthly averages of the outstanding jobs on offer at month-end (*puestos de trabajo ofrecidos para gestión pendiente de cubrir al final del mes*), provided by the INEM up to April 2005. These INEM data served in turn as the basic source of vacancies in the REMS database, run by the Ministry of Finance, as well as for the series constructed by Antolín (1994), which has been used for many years in numerous research papers on the Spanish labour market.

The INEM ceased publication of this series in May 2005. In principle, and following the methodology used up to that time, it may have been worth continuing the

series, adding the new administrative job offers to the vacancies of the previous period and subtracting those filled, both series, job offers and positions filled without debugging. SEPE (the Central Government employment agency) and Banco de España offer these monthly data on new and filled vacancies from January 1978 on. However, this procedure of extending the series of vacancies presents two problems. Firstly, it does not tie in well with the series subsequently published by Eurostat. Secondly, during the period June 2005 to July 2006 there were far more vacancies filled than there were new vacancies, so the number of vacancies calculated in this way would be negative. The SEPE itself offers an explanation of this phenomenon. Specifically, in describing the vacancies filled (*bajas de puestos ofertados*), it points out that "it may happen that in a given set of data the number of vacancies shown as filled exceeds that of those initially on offer, or subsequently increased, because the employer decides to employ more workers than the number referred to in the offer".

Figure 1 shows the vacancies that would have been obtained if the original series had been continued based on the additions to and subtractions from positions offered. As can be seen, the series of vacancies calculated in this way makes no sense since it shows an abrupt fall in the quarters immediately following the last OECD observation, resulting in negative vacancies up to the beginning of 2010.

Figure 1: OECD VACANCIES EXTENDED WITH NEW JOB OFFERS AND VACANCIES FILLED ACCORDING TO SEPE



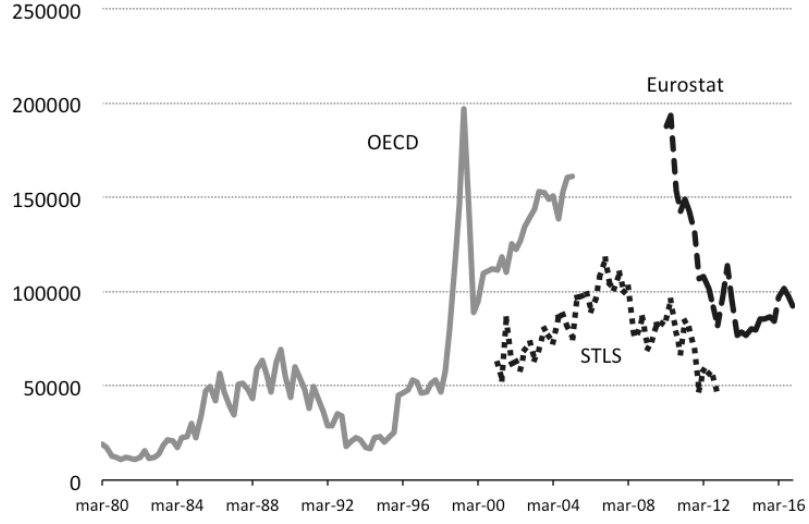
Source: Own elaboration from OECD and SEPE.

Having dismissed the possibility of using this approach to extend the series of vacancies, we turned our attention to other data sources. In this regard, from the first quarter of 2001 until the fourth quarter of 2009, Eurostat published the Job Vacancy

Statistics series (hereinafter v_t^{STLS})[1]. This series has a direct correspondence with the "vacancies on the last day of the quarter by sector of activity and size of establishment", compiled by the STLS, based on information provided by 12,700 businesses. These statistics are quarterly, but unfortunately do not include offers of government jobs. This limits the possibility of linking them directly with the v_t^{OECD} series, which does include public sector vacancies.

However, from the first quarter of 2010, Eurostat offers the series of vacancies including those offered by government departments (hereinafter v_t^{EUR}). This series is derived from the Quarterly Labour Cost Survey (QLCS), and is used in the preparation of numerous labour indicators. The sample is composed of some 28,000 Social Security contribution accounts representing a total of approximately 220,000 workers. We should highlight the fact that the new methodology takes account of sections B to S inclusive of the CNAE-09 (the Spanish version of NACE), i.e., not including agriculture. The implementation of this new methodology for calculating vacancies makes the series of vacancies shown in Eurostat homogeneous with those of other European countries. It is precisely this comparability with other countries that led us to opt for this new series when linking with the old one from the INEM/OECD (v_t^{OECD}). Figure 2 shows the three series of vacancies from which information will be used to construct the final linked series.

Figure 2: SERIES OF VACANCIES FROM OECD, STLS AND EUROSTAT



Source: Own elaboration from OECD, STLS and EUROSTAT.

(1) The Job Vacancy Statistics series is fed, in the period under consideration, by the data from the STLS. To prepare the link, the procedure of which will be explained later, we use the STLS data from the first quarter of 2001 to the fourth quarter of 2012.

2. Linking methodology

Our methodology seeks to make the series of vacancies as homogeneous as possible during the period analysed and, therefore, takes vacancies offered by the public sector into account. Both the series produced by the OECD and the latest Eurostat series include public sector vacancies[2]. However, for the period 2Q2005 to 4Q2009, the STLS series does not include this information. In the proposed link between the two series we use the information provided by the STLS on the one hand, to extrapolate forward the OECD series taking $v_{2005:1}^{OECD}$ as the starting point and, on the other hand, to retropolate (extrapolate backwards) the Eurostat series with public sector vacancies taking $v_{2010:1}^{EUR}$ as the starting point. Subsequently, the extrapolated and retropolated series are linked using the methodology proposed by Dabán, Doménech and Molinas (1997) and de la Fuente (2014).

Before establishing the link, it is appropriate to consider whether or not it is necessary to make the correction proposed by Antolín (1994) to the official INEM series of vacancies published by the OECD. Antolín finds evidence in the period 1977 to 1991 suggesting that the series of official vacancies (v_t^{OECD}) needs to be adjusted by a proportion of the ratio of nominated offers relative to generic offers:

$$v_t^{adj} = \left(1 + k\frac{nominated\ \ offers}{generic\ \ offers}\right) v_t^{OECD} \qquad [1]$$

Antolín estimates the value of k between 0.20 and 0.37 in non-linear specifications of the Beveridge curve, which include the rate of job destruction and long-term unemployment as additional explanatory variables, allowing temporary mismatches of the variables. Using these variables with a quarterly frequency, we corroborated this result from 1Q1980 to 4Q1991, the last year of the sample used by Antolín. The value of k estimated is equal to 0.23 with a t-statistics of 2.3. However, as we start to extend the sample period, gradually adding new quarters, we observe that the parameter declines in value and becomes insignificant from the end of 1992, even showing negative values from 1998 onwards, although they are close to zero and not statistically significant. In view of these results, we see no reason to adjust the INEM observed series of official vacancies and so approximate a series of total non-observed vacancies before establishing the link from 2005 onwards.

In order to extrapolate v_t^{OECD} and retropolate v_t^{EUR} we calculate the growth rate of an auxiliary series constructed by means of a two-stage estimation using information contained in the series v_t^{STLS}. In the first stage, we regress ln (v_t^{EUR}) on ln (v_t^{STLS}) for the period 1Q2010 to 4Q2012 (bearing in mind that there are no observations of v_t^{EUR} for the preceding period), i.e.

$$\ln(v_t^{EUR}) = \alpha_1 + \alpha_2 \ln(v_t^{STLS}) + u_t \qquad [2]$$

Based on the estimated values of the parameters[3] we obtain the adjusted series ln ($\tilde{v}_t^{EUR}$) for the period 1Q2001 to 4Q2009.

(2) The definitions of vacancies used by the OECD and Eurostat are uniform. For more details, please refer to Eurostat (https://goo.gl/bZpUmC) and OECD (https://goo.gl/5GPZsE).

(3) The equation estimated (standard errors in parentheses) is the following:

$$\ln(\tilde{v}_t^{EUR}) = \underset{(1.28)}{0.020} + \underset{(0.12)}{1.057}\ln(v_t^{STLS})$$

Next, in *the* second stage we regress ln (v_t^{OECD}) on ln ($\tilde{v}_t^{EUR}$) for the period immediately prior to the link, namely 1Q2001 to 1Q2005, i.e.

$$\ln(v_t^{OECD}) = \beta_1 + \beta_2 \ln(\tilde{v}_t^{EUR}) + u_t \qquad [3]$$

Using the estimated parameters of the previous regression[4] we obtain the adjusted series ln ($\tilde{v}_t^{OECD}$) from which we can recover the level $\tilde{v}_t^{OECD}$. The quarterly growth of this series is used between 2Q2005 and 4Q2012 to extrapolate and retropolate the series involved in the link. In particular, the v_t^{OECD} series is extrapolated on the basis of the 1Q2005 observation, using the following expression:

$$\hat{v}_i^{OECD} = \frac{\tilde{v}_i^{OECD}}{\tilde{v}_{i-1}^{OECD}} \hat{v}_{i-1}^{OECD} \qquad i = 1,\ 2 \ldots 20 \qquad [4]$$

where $i = 1$ is the period 2Q2005 and therefore $\hat{v}_0^{OECD} = \hat{v}_{2005:1}^{OECD} = v_{2005:1}^{OECD}$ refers to the last observation of the original OECD series of vacancies.

The $\hat{v}_t^{EUR}$ series, on the other hand, has been retropolated from the 1Q2010 observation using the expression

$$\hat{v}_{21-i-1}^{EUR} = \frac{\tilde{v}_{21-i-1}^{OECD}}{\tilde{v}_{21-i}^{OECD}} \hat{v}_{21-i}^{EUR} \qquad i = 1,\ 2 \ldots 20 \qquad [5]$$

with $\hat{v}_{20}^{EUR} = \hat{v}_{2010:1}^{EUR} = v_{2010:1}^{EUR}$ corresponding to the first real observation of the series in the period 2010:1. In Figure 3 we show both the extrapolated and the retropolated series obtained from the STLS information using the methodology described above.

There are a number of alternative approaches for linking two economic series such as those shown in Figure 3. Given that in principle the linked series of vacancies will continue to be fed in the future with data from Eurostat's Quarterly Labour Cost Survey (QLCS), it seems reasonable to conform to the existing data from this source. Therefore, one possibility for creating the link would consist in using the growth rates of the OECD series to retropolate the Eurostat series. In this way, the old data from the OECD series would be corrected upwards. Another possibility, however, would be to take the retropolated Eurostat series back to a given specific point in the old OECD series so as to smooth the change of level in the original OECD series.

Among the various possible alternatives, our choice conforms as far as possible to the information contained in the original series. Consequently, the two original series will be linked only in the period in which there are no data, so that the initial level of the link coincides with the OECD series and the final level with the Eurostat series. Specifically, we use the following expression to construct the link:

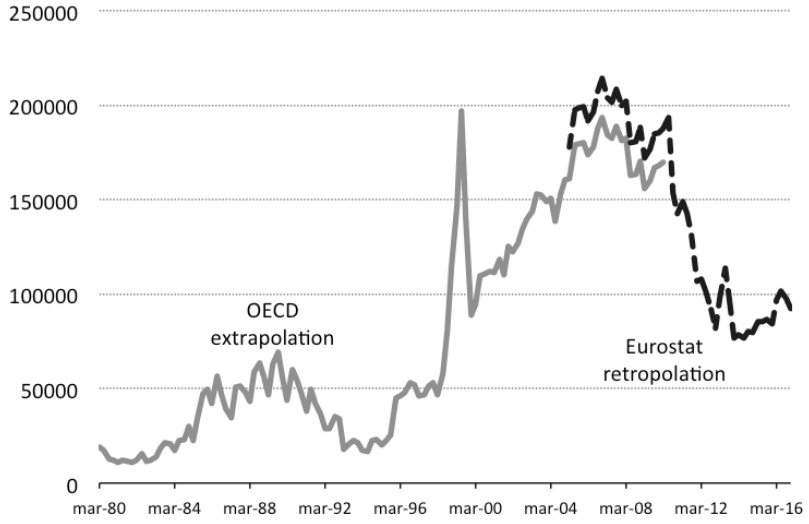
$$\hat{v}_i^{LNK} = \frac{(20-i)}{20} \hat{v}_i^{OECD} + \frac{(i)}{20} \hat{v}_i^{EUR} \qquad for\ i = 1,2,\ldots 20 \qquad [6]$$

(4) The equation estimated in this case is:

$$\ln(\tilde{v}_t^{OECD}) = \underset{(2.13)}{7.117} + \underset{(0.18)}{0.398} \ln(\tilde{v}_t^{EUR})$$

where $\hat{v}_i^{LNK}$ is the linked series of vacancies for t = 2005:2 until 2010:1. Note that the link period covers 20 observations, so that i = 1 corresponds to the period 2005:2 and i = 20 to the period 2010:1, and so that $\hat{v}_{2010:1}^{LNK} = \hat{v}_{2010:1}^{EUR}$. Note also that the procedure used requires a weighted average of the extrapolated and retropolated series. These weightings change over time, with more weight being given to the retropolated series as $\hat{v}_i^{EUR}$ we approach the period 2010:1. The final result of the procedure described above is a homogeneous series of vacancies that is not corrected for seasonality or atypical observations.

Figure 3: Series of vacancies from OECD (extrapolated) and Eurostat (retropolated)



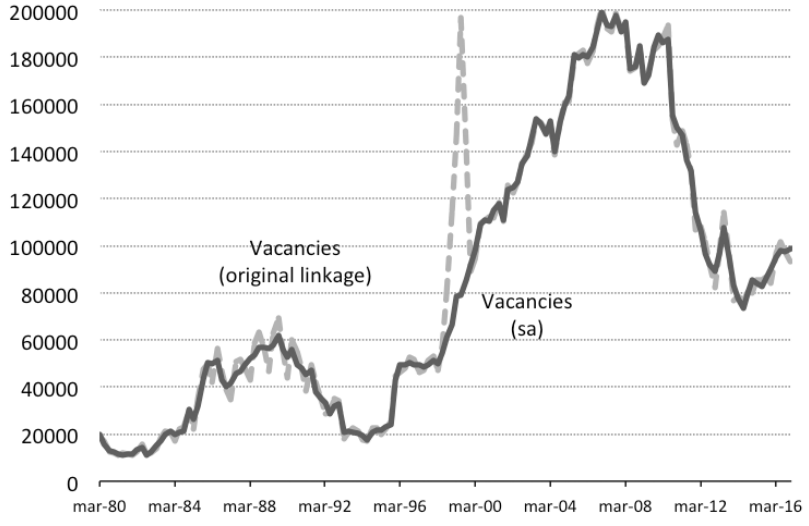
Source: Own elaboration from OECD, STLS and EUROSTAT.

Once the link has been established, we make the necessary seasonal adjustments to the series of quarterly vacancies and correct for atypical values using TRAMO/SEATS[5]. To correct the atypical vacancy data detected in the period 3Q1998 to 1999, already noted by Alvarez de Toledo, Núñez and Usabiaga (2008) and attributable to the process of competence transfers and responsibilities from the INEM to the Catalonian Employment Service between 1998 and 1999, we use the ratio between the seasonally-adjusted series of vacancies and the seasonally-adjusted active population obtained from the REMS database[6]. The end result of the process is the final seasonally-adjusted series of vacancies corrected for atypical observations presented in Figure 4.

(5) See Gómez and Maravall (1997).

(6) See Boscá *et al* (2011). The seasonally-adjusted active population found in the REMS database is obtained as the sum of the seasonally-adjusted population in employment, the source of which is the Quarterly National Accounts, and the Unemployed Persons series from the INE's Labour Force Survey (EPA in the Spanish abbreviation), seasonally adjusted using TRAMO/SEATS.

Figure 4: SEASONALLY-ADJUSTED SERIES OF VACANCIES CORRECTED FOR ATYPICAL OBSERVATIONS



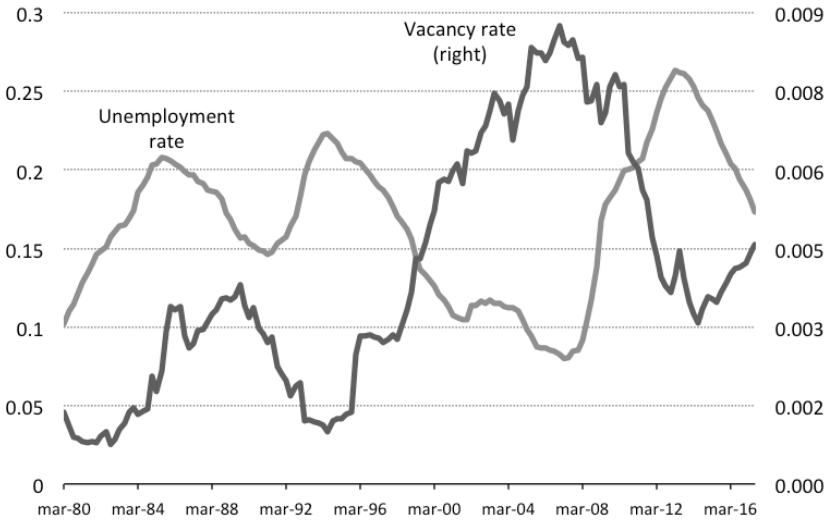
Source: Own elaboration from OECD, STLS and EUROSTAT.

3. ACTIVITY, EMPLOYMENT, UNEMPLOYMENT AND VACANCIES IN SPAIN

The link between the two series of vacancies, together with the unemployment rate and the EFPA produced by the INE, enable us to carry out a more detailed analysis of the overall behaviour of the labour market in Spain. It must be borne in mind that, although we have information from 1980 onwards for the series of vacancies and even before that for unemployment, in the case of the EFPA the information only dates back to 2Q2005.

Figure 5 shows the unemployment and vacancy rates (relative to active population), while Figure 6 shows the ratio between the two variables –from 1980 to 2016–. The relative time profiles of the vacancy and unemployment rates are fairly consistent, with a negative correlation equal to -0.47. Thus, from the beginning of the 1980s, the expansive periods of the Spanish economy have been associated both with a fall in the unemployment rate and an increase in the number of vacancies. In other words, as can be seen in Figure 6, the degree of labour market tightness has declined in recessions (for example in 1992-94 and 2008-13) and increased in times of economic boom (1996 to 2007 being the most obvious example). Of particular note is the fact that in the years of the Great Recession, despite the huge rise in unemployment and the significant decline in the number of vacancies, the latter remained at all times above the levels seen in the 1980s and 90s. As a result, the labour market tightness ($\frac{V}{U}$ ratio) in the last crisis was less pronounced than those seen on average in the 1980s and 90s.

Figure 5: Unemployment and vacancy over active population



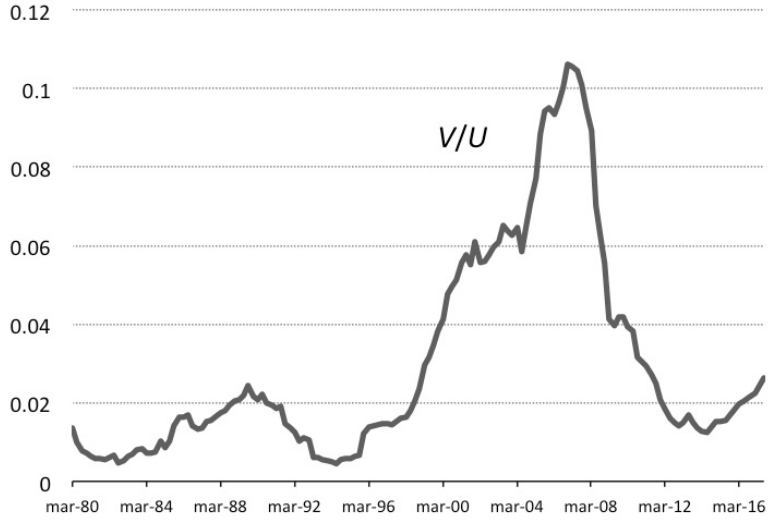
Source: Own elaboration.

Another striking observation from Figure 6 is the very low number of vacancies per unemployed worker, with an average value over the sample of 41.4 unemployed workers per vacancy. Furthermore, a characteristic feature is the high variance, with peaks of as many as 200 unemployed workers per vacancy and throughs of as few as 9 in 2006 and 2007. As a point of comparison, in the United States, the Conference Board's HWOL (Help Wanted OnLine) data series shows total US vacancies posted online and reports ratios between the number of unemployed workers and the number of vacancies fluctuating between 1 and 7 (and even falling below 1 in certain states at certain times.) Obviously, the difference in the level and number of vacancies relative to unemployment does not only depend on the statistical calculation procedure but also the customs and practices in each economy. For example, this result may be explained by recruitment mechanisms and the high turnover of temporary contracts in Spain that do not go through any formal posting procedures.

Figure 7 shows the observations from the first quarter of 1980 to the fourth quarter of 2016 of the ratio of vacancies to the active population against the unemployment rate. As can be seen, the clusters of points allow for two clearly distinct Beveridge curves. Between 1984 and 2007, the Spanish economy was moving along the curve nearer the origin[7]. However, with the onset of the 2008 financial crisis, the curve shifted to the right.

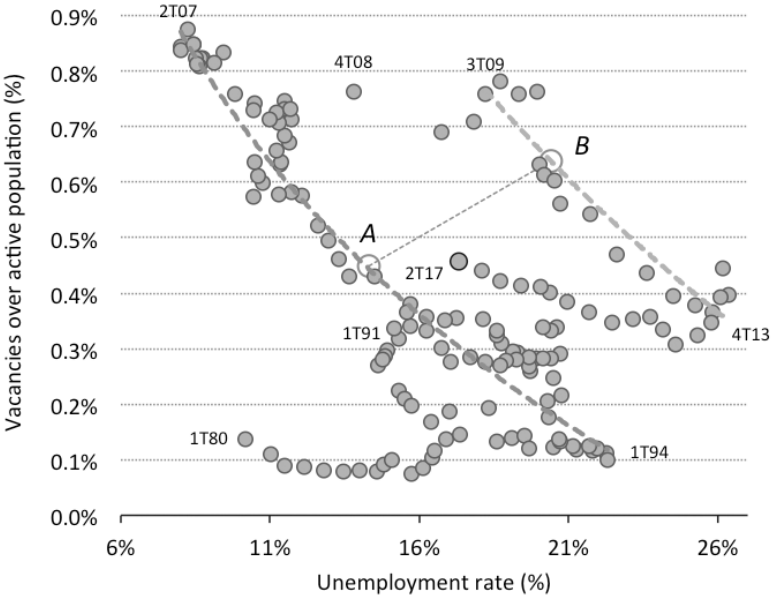
(7) The two Beveridge curves shown in the figure are the result of a logarithmic adjustment to each of the periods considered. In order to simplify the representation, we have not included any additional lags or regressors. Although quantifying the factors that may have been behind the changes in the Beveridge curve goes beyond the scope of this paper, interested readers can consult the research by Antolín (1994), Dolado and Gómez (1997), Alvarez de Toledo, Núñez and Usabiaga (2008), Villaverde, Maza and Hierro (2015), Arpaia *et al* (2014) or Bonthuis *et al* (2016).

Figure 6: UNEMPLOYMENT-VACANCIES RATIO



Source: Own elaboration.

Figure 7: BEVERIDGE CURVE IN SPAIN, 1980-2016



Source: Own elaboration.

Between 3Q2009 and 4Q2013, the Spanish economy moved along the curve away from the origin, reflecting a rising unemployment rate for the same number of vacancies. In other words, between 2008 and 2009 there was a significant increase in the labour market mismatch, due to changes occurring at the time –some of them structural– such as the crises in the construction sector and in international trade.

Generally speaking, movements along the Beveridge curve have traditionally been attributed to cyclical effects, whereas rightward shifts in the curve are said to reflect the effects of a less efficient labour market, with an increase in the structural unemployment rate [see Diamond (2013)]. Accepting that between 1984 and 2007 the position of the Beveridge curve held relatively steady, the average unemployment rate during that period was 14.25% and the vacancy rate 0.41%, as shown by point *A* in Figure 7. With the ratio $\frac{U}{V}$ holding constant, the economy would have moved to point *B* on the Beveridge curve during the period 3Q2009 and 4Q2013.

Nevertheless, the good news is that during 2014 and 2016 there was a shift towards the origin of the Beveridge curve. This shift back would be compatible with some kind of structural changes or economic policies that could have increased flexibility in the labour market, together with other factors such as the easing of the public deficit target, the ECB's expansive monetary policy, the depreciation of the euro or the fall in energy prices. Obviously, the labour reform of 2012 and the collective bargaining during those years could also be behind this effect. This return of the Beveridge curve in Spain towards its pre-crisis position has not been observed for the European Union at the aggregate level (see European Commission, 2017).

The gross transitions of individuals using the INE's EFPA enable a more in-depth analysis of these shifts in the Beveridge curve. The EFPA presents estimates from 2Q2005 of persons flowing between situations of employment, unemployment and inactivity (outside the labour force) from one quarter to another. As with the series of vacancies and unemployment, we use the data corrected for seasonality by means of TRAMO/SEATS.

Figure 8 shows job destruction (exits from employment to unemployment or "inactivity") and hirings (exits from unemployment or inactivity to employment), both expressed as percentages of active population[8]. As can be seen, job destruction peaked in the fourth quarter of 2008 and the first quarter of 2009. During the debt crisis it rose again, until the third quarter of 2011, before starting to trend downwards, especially from the second quarter of 2012.

With regard to hirings, they bottomed out in the first quarter of 2009 and remained below job destruction until mid-2013, with a consequent increase in the un-

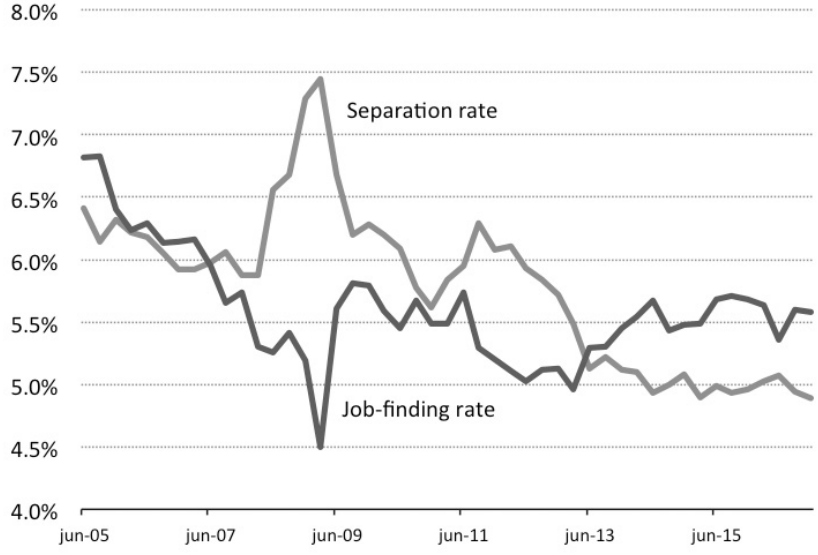
(8) The INE points out that the level of employment of the EPA of one quarter cannot necessarily be obtained by applying active population flows to the employment of the previous quarter. To ensure consistency between flows and employment (*N*), job destruction (*S*) and hirings (*H*) have been rescaled so that

$$N_t = N_{t-1} + H_t - S_t$$

This correction is of limited magnitude and does not alter the dynamic properties of the rates. In fact, the correlations between the original and corrected variables are close to unity: 0.95 in the case of hirings and 0.98 for job destruction.

employment rate. From then on, hirings started to increase, rising above job destruction, which continued to decrease. This gap between hirings and job destruction is behind the decline in unemployment from the second half of 2013. This evidence would support the view that the labour reform of 2012 did not increase job destruction. Quite the contrary: there were fewer job losses as a percentage of active population from the time of the reform than in 2009 or the second half of 2011 when the debt crisis started to intensify. In fact, job destruction as a percentage of active population from 2013 onwards is actually one point lower than it was before the economic crisis. This evidence is consistent with the results of Doménech, García and Ulloa (2016), who find that from 2012 structural shocks to wages and price margins started to have positive effects on the unemployment rate. It remains an open question to what extent these effects are the result of the labour reform, the Collective Bargaining Agreements, the easing of the public deficit target, the ECB's expansive monetary policy, the depreciation of the euro or the fall in energy prices.

Figure 8: JOB DESTRUCTION AND HIRINGS OVER ACTIVE POPULATION



Source: Own elaboration from EFPA.

However, our main motivation for analysing these flows in the labour market is to use this information to quantify the deterioration of labour market efficiency during the crisis, and its subsequent improvement during the recovery, factors which are behind the shifts in the Beveridge curve shown in Figure 7. To do so, we start out from the premise that the employment dynamic in a given quarter (*N*) can be expressed by means of the following equation:

$$N_t = (1 - s_t) N_{t-1} + h_t L_{t-1} \quad [7]$$

where s is the rate of job loss, h the rate of hiring and L the active population. Dividing the above expression by L_{t-1} we obtain:

$$(1 + \gamma_t) n_t = (1 - s_t) n_{t-1} + h_t \quad [8]$$

where γ_t is the growth rate of the active population and n_t is the rate of employment, so that $(1 - n_t) = u_t$ is the unemployment rate.

As usual in the literature[9], we assume that hirings are determined by a Cobb-Douglas function with constant returns to scale in the number of vacancies (V) and unemployed workers (U):

$$H_t = h_t L_{t-1} = A_t U_t^{\alpha} V_t^{1-\alpha} \quad [9]$$

So that the matching equation can be rewritten in terms of the vacancy and unemployment rates:

$$h_t = A_t u_t^{\alpha} v_t^{1-\alpha} \quad [10]$$

With the available flow data from 2005 on, we can estimate this function for 18 observations in the period 3Q2009 to 4Q2013. The adjustment is good ($R^2 = 0.942$) and the estimate provides values of $\alpha = 0.595$ and $A_t = 1.144$. Assuming that $\frac{U}{V} = 2.84\%$ (as in the radius vector joining points A and B in Figure 7) we find that these estimated values of $A_t = 1.144$ and $\bar{u} = 20.6\%$ characterise the position of the Beveridge curve between 3Q2009 and 4Q2013.

For the period 1Q1994 to 2Q2007 we can proceed inversely, bearing in mind that the equation [8] can be written as:

$$(1 + \gamma_t)(1 - \bar{u}) = (1 - s)(1 - \bar{u}) + A\left(\frac{\bar{v}}{\bar{u}}\right)^{1-\alpha} \bar{u} \quad [11]$$

Solving for:

$$\bar{u} = \frac{\gamma + s}{\gamma + s + A\left(\frac{\bar{v}}{\bar{u}}\right)^{1-\alpha}} \quad [12]$$

Using the average values $\gamma = 0.2\%$, $s = 5.6\%$, $\bar{u} = 14.25\%$ and $\bar{v} = 0.41\%$ (which characterise point A in Figure 7), we see that matching efficiency $A_t = 1.471$ solves equation [12].

In short, the economic crisis led to a loss of labour market efficiency as a result of a sectoral reallocation of productive factors. In the two years from 3Q2007 to 2Q2009, the efficiency parameter of the matching function declined from 1.471 to 1.144. For four and a half years, between 3Q2009 and 4Q2013, the Beveridge curve held relatively steady, while the Spanish economy moved along it, with a cycli-

(9) See, for example, the survey by Petrongolo and Pissarides (2001).

cal increase in unemployment. As the economy recovered, we see that from 2014 onwards there is a shift in the Beveridge curve, and by the end of 2016 it had recovered three-quarters of the shift that took place during the crisis. Although the sectoral reallocation does not seem to have had any permanent effect on the unemployment rate, thus ruling out full hysteresis, its effects have been quite long-lasting and persistent in terms of changes in the efficiency of the labour market: ten years on, the Beveridge curve has still not completely returned to its pre-crisis position.

4. Macroeconomic effects of shifts in the Beveridge curve

4.1. Description of the model

In this section, we simulate the macroeconomic effects of the abovementioned shifts in the Beveridge curve observed during the last economic crisis and the subsequent recovery. These simulations were carried out using the REMS general equilibrium model for the Spanish economy, which we describe briefly below. Interested readers can find more details in Boscá *et al*., 2010 and 2011.

REMS is a Neo-Keynesian model derived from intertemporal optimisation by representative households and firms under different technological, budgetary and institutional constraints. Their economic decisions are thus built on solid micro-foundations. Behaviour is predominantly forward-looking and short-term dynamics are consistent with the neoclassical growth model that determines economic developments over the long run. However, since markets for goods and services, and products operate under monopolistic competition, the levels of employment and economic activity are lower than those that would prevail in a perfectly competitive setting. This is particularly important in the case of employment, since the model is capable of reproducing a situation of structural equilibrium unemployment in excess of that which would exist in a situation of full employment.

Specifically, unconstrained or Ricardian households intertemporally optimise the utility derived from consumer goods, leisure and money balances, subject to a budgetary restriction (in which the resources are income from labour and capital) and to the laws of motion of employment and capital. Restricted or "rule-of-thumb" consumers do not have access to financial markets, so they cannot accumulate capital or government bonds, and their consumption is limited by their current income from labour. Households are the owners of the available factors of production and of all the businesses operating in the economy. They rent out physical capital (Ricardian consumers) and labour services (both Ricardian and rule-of-thumb consumers) to firms, in exchange for a rental cost and wages. All households in the economy pay taxes and receive transfers from the government.

For its part, the public sector faces a budgetary restriction in each period, whereby total public spending (public consumption, public investment, unemployment benefits and social and other transfers) are financed by issuing debt and by a wide range of taxes on income from labour and capital, on energy and consumption, and social security contributions. The intertemporal sustainability of the public accounts is assured by a reaction function whereby transfers accommodate the deviation of the ratio of public debt to GDP from its target level.

Monetary policy is determined by the European Central Bank (ECB) via a Taylor-type rule, whereby the interest rate responds to deviations of inflation from its target and to the cyclical output gap, both variables referring to the euro zone. Added to this interest rate is the risk premium of the Spanish economy, which is a function of its indebtedness to the rest of the world (resulting from the accumulated current account balance). As a result, this model of an open economy has a stable equilibrium and financial shocks, which were crucial in the last crisis, can affect the endogenous variables.

The productive sector is composed of two sectors. The first produces intermediate goods and is composed of firms operating in a situation of monopolistic competition and using capital, labour and energy. The second is the final goods sector, which combines the differentiated intermediate goods to produce the final goods for exports, capital expenditure and private and public consumption.

In the short run, REMS incorporates nominal, real and financial frictions. Real frictions include adjustment costs in consumption (via habits in consumption and rule-of-thumb households) and investment in productive capital. The model also allows for slow adjustment in wages and price rigidities, which are specified through a Calvo-type Phillips curve.

Many of the characteristics described above are similar to those of other existing models for the Spanish economy [see, for example, Andrés *et al*. (2006), or Burriel, Fernandez-Villaverde and Rubio (2007)]. The main difference between REMS and these models is its specification of the labour market in accordance with the proposals of Andolfatto (1996) and Merz (1995), which makes it especially suited for simulating the effects of the shifts in the Beveridge curve identified in the previous section. In line with this, Fonseca and Muñoz (2003) propose a DSGE for the Spanish economy that incorporates a search model like that of Pissarides (2000), but for a closed economy, without a public sector and without the numerous nominal, real and financial frictions that characterise the REMS model.

Labour market search models have proved very useful when providing microfoundations for the existence of long-term equilibrium unemployment and explaining extensive and intensive margins of employment (workers in employment and hours per worker, respectively). Unlike the competitive paradigm of the labour market, in REMS job matches are subject to transaction costs. Unemployed workers devote part of their available time to search activities in order to find vacant posts offered by firms. In each period, there are flows in both directions (from employment to unemployment and inactivity, and vice versa) so that unemployment stabilises at its structural rate ($\bar{u}$) if creation and destruction balance each other out, in line with equation [8] in the previous section:

$$\left(1+\gamma_t\right)\overline{n} = \left(1-s\right)\overline{n} + A_t\left(\frac{\overline{v}}{\overline{u}}\right)^{1-\alpha}\overline{u} \qquad [13]$$

Because unemployed workers need to devote time to seeking vacancies but do not receive any wages while doing so, and because firms face costs in having open vacancies, an economic rent emerges with each new job created, which is equal to the sum of the expected search costs the firm and the worker will further incur if they fail to match. The presence of this rent gives rise to a bilateral monopoly situation

whereby both parties cooperate for a win-win job match, but compete for the share of the overall surplus. To determine the equilibrium, REMS assumes that firms and workers negotiate hours (l_t) and wages (w_t) by means of a Nash bargaining process such as that proposed by Pissarides (2000), which maximises the weighted proceeds of the surpluses for both parties:

$$\max_{w_t, l_t} \left(\lambda_{ht}\right)^{\lambda^w} \left(\lambda_{ft}\right)^{1-\lambda^w} \qquad [14]$$

where $\lambda^w \in [0,1]$ represents workers' bargaining power. The first term refers to the workers' surplus (expressed in consumer goods) for working relative to being unemployed, which in turn is a weighted average of Ricardian and rule-of-thumb consumers. The second term is the representative firm's surplus, which is equal to the marginal productivity of the new job plus the saving of the cost that would be incurred if the match were not made and the vacancy were to remain open. As shown by Boscá *et al* (2011), the equilibrium wage in each period is a weighted average which depends on λ^w, between the maximum wage that firms would be prepared to pay when their bargaining power is zero (i.e., the marginal productivity of the labour plus the cost of filling the vacancy) and the minimum wage acceptable when workers' bargaining power is zero (i.e., the reservation wage).

4.2. Simulation of the shifts in the Beveridge curve

Using REMS, in this section we simulate the macroeconomic effects of the estimated changes in the efficiency parameter A_t in matching unemployed workers with vacancies starting from a steady state. In particular, our simulation assumes the following changes in this parameter[10]:

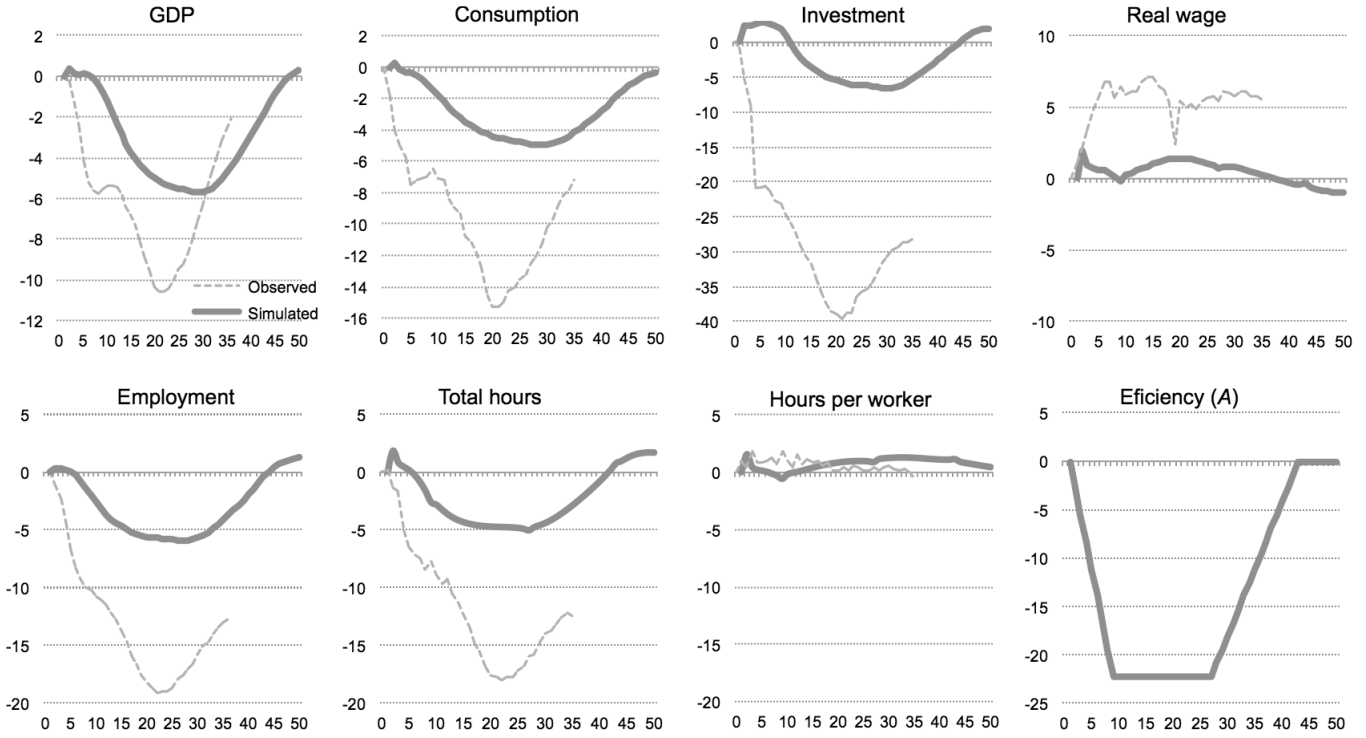
- Gradual decline of A_t over 8 quarters from 1.471 to 1.144.
- For 18 quarters A_t remains constant and equal to 1.144.
- Gradual increase in A_t over 16 quarters, from 1.144 to 1.471.

As can be seen, the recovery in the value of A_t is approximately half as fast as its decline. In fact, up until the end of 2016 it took some three years to recover 75% of the efficiency lost in just two years. The reasons for these changes in A_t lie beyond the scope of this work. In any case, the sectoral reallocation of factors of production following the bursting of the property bubble, the financial and debt crisis and the wage and price margin shocks (Doménech, García and Ulloa, 2016) is consistent with the results of the simulation as explained below.

In the lower right panel of Figure 9 we have shown the percentage deviation in the efficiency parameter A_t described above, which acts as a shock giving rise to the responses of the remaining simulated variables, also in terms of percentage deviations relative to the steady state. To facilitate interpretation of the result, the remaining panels show these simulated responses together with the dynamic actually observed for these variables between 1Q2008 and 4Q2016, although in the latter case the percentage deviations refer to the initial level in the first quarter of 2008.

(10) Andrés and Ferri (2017), in an estimated general equilibrium model, also find negative shocks which affect the parameter up to 2013 and a subsequent change of sign, which contributes positively to the reduction in unemployment after that period.

Figure 9: MACROECONOMIC REACTIONS TO THE OBSERVED SHIFT IN THE BEVERIDGE CURVE



Note: Simulated series in solid line and observed series in dashed line.

Source: Own elaboration.

The top left panel shows the simulated response of GDP over the population of working age, which declines by much as 5.7% after 30 quarters before starting to recover and returning to its initial level after 50 quarters. This fall in GDP, caused by the loss of efficiency in A, is equivalent to 55% of the fall actually observed and takes place with a certain lag. Obviously, we cannot expect the various shocks that have affected the Spanish economy during the crisis and the subsequent recovery (financial stresses, international trade, bank restructuring, debt crisis, increase in risk premiums, fiscal expansion and consolidation, structural reforms, etc.) to have given rise to a sectoral reallocation of factors of production, the effects of which on the parameter A_t could explain the dynamic of GDP without taking account of the movements along the Beveridge curve. In fact, before the onset of the crisis, the Spanish economy had the highest ratio of vacancies per unemployed worker in its recent history, having built up substantial imbalances.

Something similar occurs in qualitative terms with private consumption and investment, although the gap with the dynamic actually observed with these variables is wider. Here it has to be borne in mind that, whereas the simulation starts out from a steady state, to which it returns in the long run, in the case of consumption and investment it starts out from a situation in which significant imbalances had built up, reflected in an unprecedented property bubble and a large current account deficit, among other variables. This deficit meant that part of private consumption and investment was met by imports, in turn generating employment in the rest of the world. As a result, its adjustment may have been greater than that observed in domestic GDP and employment. The unsustainable nature of these imbalances makes it difficult to imagine that rates of consumption and especially investment relative to GDP can return to pre-crisis levels. In the case of consumption, the simulated fall is 5%, slightly less than that of GDP, due to the presence of Ricardian consumers, who can smooth their consumption intertemporally to some extent. The simulated fall in private investment is more than 6.6%. Although investment declines somewhat more than GDP in the simulation, its volatility is not as pronounced as that seen in the case of a technological shock [see Boscá *et al*. (2010)]. The reason is that the loss of efficiency in the labour market reduces the probability of filling vacancies, making hiring more expensive relative to the cost of use of capital, which in fact gives rise to an increase in investment in the first few quarters.

The simulated behaviour of employment is very similar to that of GDP, with elasticity close to unity (consistent with estimates of the Okun coefficient for Spain), but less than that observed during the crisis, when employment fell by nearly twice as much as GDP. This fall in employment brought about by the loss of efficiency in A_t is equivalent to 31% of that which actually took place during the crisis. The fact that employment fell by more than GDP in the data relative to the simulation is consistent with an additional wage shock such as that estimated by Doménech, García and Ulloa (2016), especially the one in 2009, which is said to have given rise to an increase in wages and productivity and a significant reduction in employment. In fact, in Figure 9 we see that the simulated initial increase in wages is considerably less than that actually observed on average over the period (5.8%).

It is also interesting to note that the increase in the average number of hours worked per worker in the simulation (slightly more than 1%) is consistent with the

evidence of the Spanish economy during the crisis, which also shows an increase in average hours per employee. This response is explained by the fact that, as a result of the loss of efficiency in the process of matching unemployed workers with vacancies, firms prefer to increase the intensive margin (average hours per worker) and reduce the extensive margin (job positions).

In summary, the simulation of the effects produced by the shifts in the Beveridge curve observed during the crisis and the subsequent recovery of the Spanish economy between 2008 and 2016 is consistent with the dynamic observed in the main macroeconomic aggregates. This loss of efficiency in the process of matching vacancies and unemployed workers could explain as much as 31% of the fall in employment and 55% of that in GDP at the height of the crisis.

5. Conclusions

In this article we have obtained a homogenous series of vacancies for the Spanish economy from the first quarter of 1980 to the end of 2016, which links the INEM's series up to the first quarter of 2005, the Short-Term Labour Survey series from the second quarter of 2005 to the fourth quarter of 2009, and the Eurostat series from the first quarter of 2010.

This homogeneous series of vacancies offers useful information on the behaviour of the labour market in Spain over the past few decades. The Beveridge curve obtained with this homogenous series of vacancies shows that the most recent economic crisis entailed a loss of labour market efficiency as a result of the reallocation of productive factors among sectors. Up until the second half of 2009, the unemployment rate increased and the efficiency parameter of the matching function between unemployed workers and vacancies declined by 22.2%. For four and a half years, between 3Q2009 and 4Q2013, the Beveridge curve was relatively steady, while the Spanish economy moved along it, with a cyclical increase in unemployment and a fall in the vacancy rate. With the recovery from 2014 onwards, there was a shift towards the origin in the Beveridge curve, such that by the end of 2016, it had recovered three-quarters of the shift that took place during the crisis, with a consequent decline in the unemployment rate. Although the sectoral reallocation does not appear to have had permanent effects on the unemployment rate, thus ruling out full hysteresis, its effects have been quite long-lasting and persistent over time.

Using the INE's Labour Force Flows Statistics we have calibrated the magnitude of these shifts in the Beveridge curve, which enabled us to simulate their macroeconomic effects on the Spanish economy. Our results show that, although these effects do not entirely explain the dynamic observed in the main macroeconomic aggregates (also affected by the movement along the Beveridge curve), they do explain it in part and are consistent with the evidence. Specifically, the shift in the Beveridge curve might explain up to 31% of the fall in employment and 55% of the fall in GDP in the most severe phase of the crisis.

The decline in the structural unemployment rate, with the consequent shift in the Beveridge curve towards the origin, is one of the main challenges for the Spanish economy. A permanent reduction of unemployment by means of structural measures in a wide range of areas, as proposed for example by Andrés and Doménech (2015) and BBVA

Research (2016), can be substantially facilitated by taking advantage of the opportunities offered by the process of technological and digital transformation underway. Full use must be made of platforms containing exhaustive information on all vacancies and job searches, public-private collaboration and big data analysis, in order to identify offers of interest for both firms and workers, anticipate training needs and maximise the efficiency of the search-and-matching process. Without doubt, this should be one of the priorities of the Spanish policy makers and the European institutions.

REFERENCES

Alvarez de Toledo, P.Á., Núñez, F. and Usabiaga C. (2008): "La función de emparejamiento en el mercado de trabajo español". *Revista de Economía Aplicada*, vol. 16, n. 48, pp. 5-35. https://goo.gl/HNQqUg

Andolfatto, D. (1996): "Business Cycles and Labor-Market Search". *American Economic Review*, vol 86, n. 1, pp. 112-132.

Andrés, J. and Doménech, R. (2015): *En busca de la prosperidad. Los retos de la sociedad española en la economía global del siglo XXI*. Deusto Ediciones, Barcelona. www.enbuscadelaprosperidad.com

Andrés, J. and Ferri, J. (2017): "Precio de la vivienda, empleo y PIB en España". DT Estudios sobre la Economía Española, 2017/09. FEDEA.

Andrés, J., Burriel, P. and Estrada, A. (2006): "BEMOD: A DSGE Model for the Spanish Economy and the Rest of the Euro Area". *Banco de España Research Paper*, WP-0631. https://goo.gl/y055eW

Antolín, P. (1994): "Unemployment flows and vacancies in Spain". IVIE WP-EC 94-05. https://goo.gl/gDVt6X

Antolín, P. (1999). "La curva Beveridge y las disparidades regionales en España. *Papeles de Economía Española*, vol. 80, pp. 69-78. https://goo.gl/7v1KGb

Arpaia, A., Kiss. A. and Turrini. A. (2014): "Is unemployment structural or cyclical? Main features of job matching in the EU after the crisis". *European Economy Economic Papers*, n. 527. https://goo.gl/Pt0Y5h

BBVA Research (2016): "Hacia un mercado de trabajo más eficiente y equitativo". Observatorio Económico España. https://goo.gl/xbYmdQ

Bentolila, S., Cahuc, P., Dolado, J.J. and Le Barbanchon, T. (2012): "Two-tier labour markets in the Great Recession: France versus Spain". *The Economic Journal*, vol. 122, n. 562, pp. 155-187. https://goo.gl/77T7xa

Beveridge, W.H. (1945): *Full employment in a free society.* Norton. https://goo.gl/mcZxNa

Bonthuis, B., Jarvis, V. and Vanhala J. (2016): "Shifts in euro area Beveridge curves and their determinants". *IZA Journal of Labor Policy*, vol. 5, n. 20, pp. 1-17. https://goo.gl/AF4eLE

Boscá, J.E., Díaz, A., Doménech, R., Ferri, J., Puch, L. and Pérez, E. (2010): "A Rational Expectations Model for Simulation and Policy Evaluation of the Spanish Economy". *SERIEs: Journal of the Spanish Economic Association*, vol. 1, n. 1-2, pp. 135-169. https://goo.gl/XrKtK2

Boscá, J.E., Doménech, R., Ferri, J. and Varela J. (2011): *The Spanish Economy: A General Equilibrium Perspective.* Palgrave MacMillan. http://goo.gl/c36j5K

Bouvet, F. (2012): "The Beveridge curve in Europe: new evidence using national and regional data". *Applied Economics*, vol, 44, n. 27, pp. 3585-3604. https://goo.gl/wZMFkL

Bova, E., Jalles, J.T. and Kolerus, C. (2017): "Shifting the Beveridge Curve: What Affects Labor Market Matching?". *International Labour Review* (in press). https://goo.gl/iDrFw2

Burriel, P., Fernández-Villaverde, J. and Rubio, J. (2010): "MEDEA: A DSGE Model for the Spanish Economy". *SERIEs: Journal of the Spanish Economic Association*, vol. 1, n. 1-2, pp. 175-243. https://goo.gl/R0pSbS

Castillo, S., Jimeno, J.F. and Licandro, O. (1998): "Employment Segmentation, Labour Mobility and Mismatch: Spain, 1987-1993". DT 1998-04 FEDEA. https://goo.gl/hgxTLu

European Commission (2017): *Employment and Social Developments in Europe Quarterly Review.* Winter. https://goo.gl/WBlJ86

Dabán, T., Doménech, R. and Molinas, C. (1997): "International and Intertemporal Comparisons of Real Product in OECD Countries: A Growth Sensitivity Analysis". *Review of Income and Wealth*, vol. 43, n. 1, pp. 33-48. https://goo.gl/Ki6bUU

de la Fuente, A. (2014): "A mixed splicing procedure for economic time series". *Estadística Española*, vol. 56, n. 183, pp. 107-21. https://goo.gl/VBMxh0

Diamond, P. (2013): "Cyclical unemployment, structural unemployment". *IMF Economic Review*, vol. 61, n. 3, pp. 410-455. https://goo.gl/idtvfP

Dolado, J.J. and Felgueroso, F. (2012): "El aumento desenfrenado del paro: ¿cíclico o estructural?". Nada es Gratis. https://goo.gl/PueDu5

Dolado, J.J. and Gómez, R. (1997): "La relación entre desempleo y vacantes en España: perturbaciones agregadas y de reasignación". *Investigaciones Económicas*, vol. 21, n. 3, pp. 441-472. https://goo.gl/rZLGKH

Doménech, R., García, J.R. and Ulloa, C. (2016): "The Effects of Wage Flexibility on Activity and Employment in the Spanish Economy". WP 16/17 BBVA Research. https://goo.gl/Z57Zyn

Estrada, A., García-Perea, P. and Izquierdo. M. (2004): "Los flujos de trabajadores en España: El impacto del trabajo temporal". Working Document 0206. Banco de España. https://goo.gl/cRo8Tj

Fonseca, R. and Muñoz, R. (2003): "Can the matching model account for Spanish unemployment?". *Investigaciones Económicas*, vol. 27, n. 2, pp. 277-308. https://goo.gl/gucJLh

Gómez, V. and Maravall A. (1997): "TRAMO and SEATS – Instructions for the user". Banco de España. https://goo.gl/Yek4o4

Haincourt, S. and Mogliani M. (2012): "Has the 2008-2009 recession increased the structural share of unemployment in the euro area?". *Quarterly Selection of Articles, Bulletin de la Banque de France*, vol. 25, pp. 63-80. https://goo.gl/hMH1Rh

Hobijn B. and Sahin A. (2013): "Beveridge Curve Shifts across Countries since the Great Recession". *IMF Economic Review*, vol. 61, n. 4, pp. 566-600. https://goo.gl/7xW0xO

Merz, M. (1995): "Search in the Labor Market and the Real Business Cycle". *Journal of Monetary Economics,* vol. 36, n. 2, pp. 269-300.

Pissarides, C.A. (2000): *Equilibrium Unemployment Theory*. MIT Press.

Petrongolo, B. y C. Pissarides (2001): "Looking into the Black Box: A Survey of the Matching Function". *Journal of Economic Literature*, vol. 39, pp. 390-431. https://goo.gl/oOrMoj

Villaverde, J., Maza A. and Hierro M. (2015). "La curva de Beveridge en España: nueva evidencia para el período 2000-2011". *Cuadernos de Economía*, vol. 34, n. 64, pp. 199-228. https://goo.gl/T9W6G2

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RESUMEN

En este artículo construimos una serie homogénea de vacantes para la economía española desde 1980 a 2016, lo que nos permite realizar un análisis de los efectos del ciclo económico sobre la relación entre desempleo y vacantes. La metodología empleada requiere un enlace entre la antigua serie de vacantes del INEM y la nueva serie de Eurostat, para lo que utilizamos la información procedente de la Encuesta de Coyuntura Laboral. El análisis de esta nueva serie homogénea muestra que la curva de Beveridge se desplazó entre 2008 y 2009 debido a la menor eficiencia del proceso de emparejamiento entre vacantes y desempleados. Utilizando un modelo de equilibrio general realizamos una simulación de los efectos macroeconómicos de esta caída en la eficiencia en la economía española. El modelo genera movimientos en el PIB y el empleo en la misma dirección que los observados, aunque de menor magnitud. La evidencia ofrecida muestra también que, desde 2014, la curva de Beveridge estaría recuperando gradualmente su posición anterior a la crisis, con la consiguiente disminución de la tasa de desempleo.

Palabras clave: vacantes, desempleo, curva de Beveridge.

Clasificación JEL: E24, J63, J64.