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Biannually

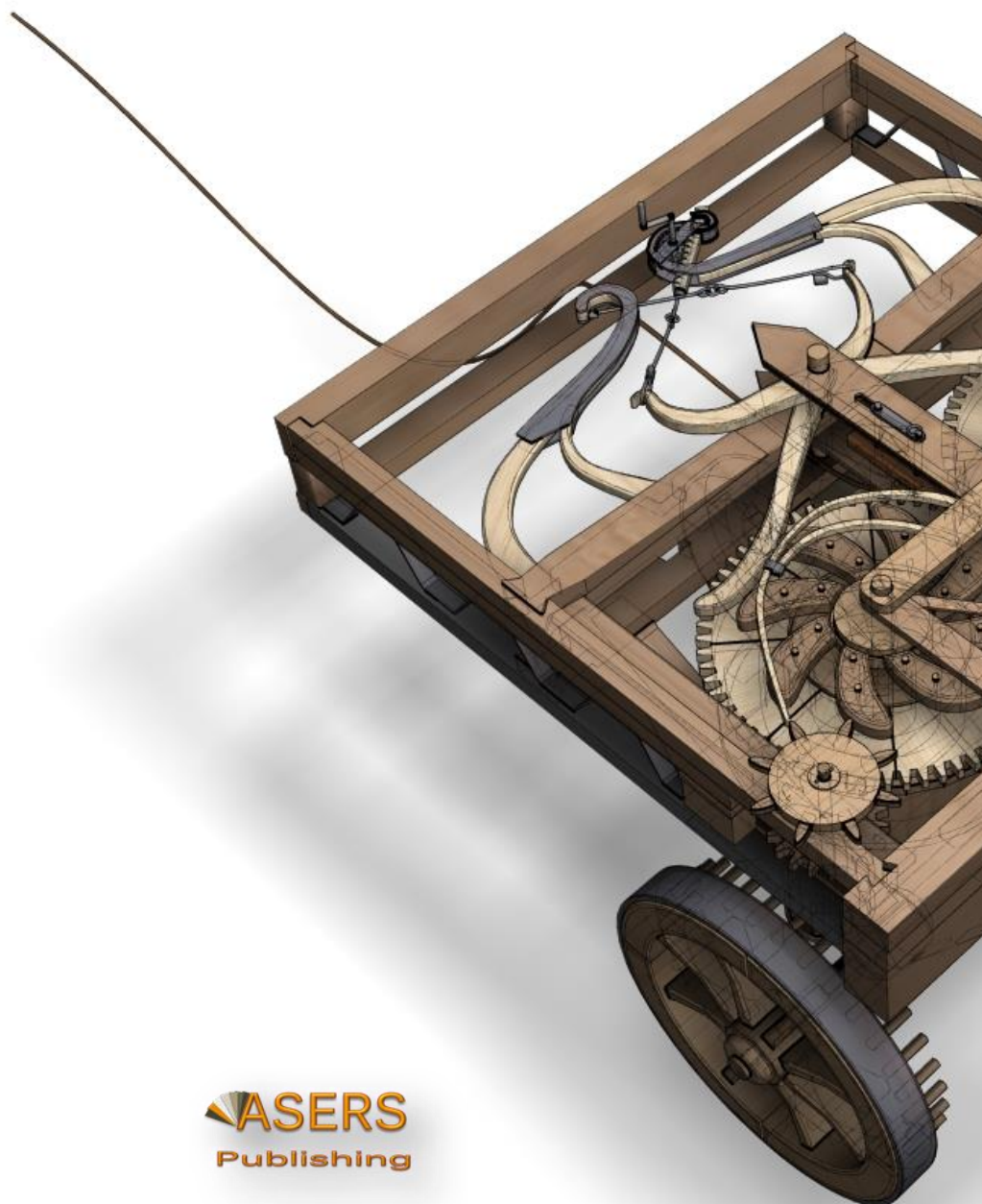
Volume IV

Issue 1 (7)

Summer 2013

ISSN 2068 – 7710

 **ASERS**
Publishing



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THE CONSUMPTION-INVESTMENT-UNEMPLOYMENT RELATIONSHIP IN SPAIN: AN ANALYSIS WITH REGIONAL DATA

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Abstract:

In this paper we analyze the consequences of changes in the consumption patterns on unemployment through an intermediate channel via investment. Specifically, after presenting our theoretical framework, we build a dynamic econometric multi-equational model, in which we estimate a consumption function, an investment function and an unemployment rate equation, using a panel of 17 Spanish regions. This model is characterized by its dynamics and the cross equation relationships. After estimating the model, we run a number of dynamic simulations in order to verify our starting hypothesis, namely that temporary and persistent shocks to consumption have long lasting effects on unemployment, both directly and indirectly, through investment. Our results are especially relevant in the current recessive context of the Spanish economy, which is characterized by severe falls in consumption and unprecedented increases in unemployment.

Keywords: consumption, investment, unemployment, panel data.

JEL Classification: E21, E22, E24

1. Introduction

One of the most prominent and worrying characteristics of the Spanish economy nowadays is the magnitude of the unemployment rate, which after reaching a 25-year low value in the second quarter of 2007 at 7.9%, at the writing of this paper it has peaked to an unprecedented 25% at the third quarter of 2012. Therefore it is not surprising that the declared objective of the main policies followed since the beginning of the recession is to resume the growth and employment creation path that characterized the 2000's. The contribution of the paper is twofold. Firstly, we show theoretically the existing interrelation between the two major components of aggregate demand, consumption and investment (they usually sum up to a 75% of a country's GDP), and their joint effect on unemployment rate dynamics, as well as the effects of variations in unemployment on consumption. Secondly, we provide empirical evidence supporting this view, based on the estimation of a panel data econometric model, using information gathered for the 17 Spanish regions. The paper is organized as follows. Section 2 provides the motivation for the paper while Section 3 summarizes the theoretical foundations of the relationship between consumption, investment and unemployment. Section 4 presents the econometric model and the main empirical results, while Section 5 summarizes the results of a number of dynamic simulations. Finally, Section 6 concludes.

2. Motivation

While labor economists have focused their attention into a vast number of issues throughout the last decade, more recently their attention has turned back to unemployment and its persistence, precisely when the current recession has brought the unemployment figures back to the high levels of the 80's. In this context, the aim of the paper is to analyze the relationship between consumption, investment and unemployment.

The interest in the analysis of the relationship between aggregate demand variables (consumption and investment) and unemployment is derived from the observed discrepancy between

the assumptions and implications of the main macro-labor models on the one hand, and what economic and policy agents (as well as existing data) suggest.

The main social agents (politicians, trade unions, businesses representatives) use to link swings in employment with the evolution of investment.¹ However, such relationship cannot be derived from the main theoretical approaches on the labor markets functioning. The effects of an expansion in the aggregate demand on unemployment would only be observed in the short run, being therefore temporary, given that in the longer run these effects vanish and the unemployment rate would return to its equilibrium value (either the natural rate of unemployment, NRU, or the non - accelerating inflation rate of unemployment, NAIRU), when the economy reaches again the vertical long run Phillips Curve. The existence of hysteresis in the labor market allows for prolonged effects of changes in the aggregate demand on unemployment, such that cyclical variations in the unemployment rate become structural. This goes against the standard NRU models, which rely on the assumption that the cyclical and structural components of unemployment are independent of each other, such that in the absence of errors in expectations, and once that the Walrasian equilibrium conditions are fulfilled; the unemployment rate reaches its natural value, as Friedman (1968) describes.

Most of the theoretical approaches to unemployment, through different analytical perspectives, follow one of these conflicting theories. However, the Chain Reaction Theory (CRT hereafter) asserts that the short, medium and long run are not compartmentalized, but that they interrelated in inter - temporal continuum, through slow and prolonged adjustment processes². Under this view it is shown that the cyclical and structural components of unemployment are interdependent, i.e., temporary and permanent components are interrelated through time, such that the effects of shocks in the labor market (as those steaming from changes in demand) persist in the medium and the long run. In fact, this theory holds that the differentiation between the cyclical and structural component of unemployment is meaningless.

The interaction between dynamics in the labor markets and growing exogenous variables gives rise to the so-called “frictional growth” phenomenon, which precludes the unemployment rate approaching towards the NRU. This different perception on the causes of unemployment and its persistence has its ultimate reflection in the proposed policy measures targeted at reducing the unemployment rate. While the NRU argues in favor of supply side policies (labor market flexibilization, tougher conditions for access to unemployment benefits, etc.) the CRT proposes the use of aggregate demand policies to stimulate economic activity and to reduce unemployment and its persistence (tax cuts on consumption, increased government spending, investment stimuli, etc.)³. In this context, in spite of the statements and electoral promises by policymakers, the standard policy rule is to flexibilize the labor market and its institutions, which in many cases has the opposite effect on the final target⁴.

The existence of an explicit relationship between unemployment and aggregate demand has not been popular in the macro-labor literature so far. However, a growing number of authors, from very different analytical approaches and for different countries and periods, have found a significant negative relationship between the growth in the capital stock and the equilibrium unemployment rate.

Since the paper by Rowthorn (1999), who takes a CES production function in the context of the Layard, Nickell and Jackman (1991) model, and finds that increases in the capital stock may reduce

¹The current President of the Spanish Government, Mariano Rajoy, asserted recently in a partisan meeting in June, 2012, that “Without credit there are no banks, without banks there is no investment, and without investment there is no employment” (see <http://noticias.es.msn.com/rajoy-sin-cr%a9dito-no-hay-bancos-y-sin-bancos-no-hay-inversi%a3%b3n-ni-hay-empleo>).

² The CRT was proposed and developed by Dennis Snower and Marika Karanassou in a series of papers. See Karanassou *et al.* (2010) for a general view on this theory.

³ The papers by Karanassou *et al.* (2008), Karanassou and Sala (2012) or Bande and Karanassou (2013) emphasize the role of frictional growth in the explanation of unemployment in different economies.

⁴ For instance, in the Spanish case, the current government proposed during the electoral campaign of November 2011, to reduce unemployment through an investment boost. Nevertheless, the legislative reforms implemented since it took office consisted in a deep reform of the labour relations framework.

theoretically the equilibrium unemployment, many papers have also shown this type of negative relationship between investment (growth of capital stock) and the equilibrium unemployment rate, both in the medium and long run⁵. This result seems to be robust across different type of modelizations and countries.

Malley and Moutos (2001), using data for OECD countries, find that differences across countries in capital accumulation explain to a greater extent the existing differences in unemployment. Countries with greater capital accumulation (with respect to its trade partners) are those exhibiting lower unemployment rates. Alexio and Pitelis (2003), in an applied exercise for different European countries, also find that one of the potential factors explaining the high and persistent unemployment rates in Europe is an insufficient capital stock growth, as well as an inadequate aggregate demand. They conclude that variations in the components of the demand (and not only in investment) are relevant to explain unemployment fluctuations, a result which is in line to our appraisal.

Kapadia (2005) introduces a production function with capital restrictions, in which installed capacity is determinant. When the capital stock is low, investment has a positive effect on the employment level, and modifies the equilibrium (it reduces the natural rate of unemployment). However, new investment above a given threshold has a neutral effect on (un)employment, it exclusively pushes up real wages. In other words, when the firm has spare capacity, capital accumulation is not able to reduce equilibrium unemployment, and we would be under the standard framework. As long as the firm reaches its potential capacity (which takes place when the capital-labor ratio falls short of the capital restrictions threshold), labor participation in the product, and therefore the wage participation, is reduced, while the capital (and profits) participation rises. This increase in the expected revenues affects investment, and directly reduces the natural rate of unemployment. In this same line, Arestis *et al.* (2007), in a study about the importance of capital stock in the determination of real wages and (un)employment for a panel of nine European countries, confirm their starting hypothesis, namely that capital stock is key in the determination of the wage and unemployment levels in an economy. Moreover, capital scarcity will persistently affect the equilibrium unemployment rate, and for prolonged periods of time. According to these authors, the low capital accumulation rates in the countries under scrutiny led to lower capital stocks and a consequent scarcity. Thus, real wages were too high given the changes in productivity, and due to a limited factor substitution, the predominance of capital-intensive investment brought restrictions in the adjustment between demand and supply of labor.

If we regard the capital stock as a main determinant of the NRU or the NAIRU, we are assuming that there exists a changing factor which modifies continuously the equilibrium unemployment rate. The pace and structure of investment will be influenced by the level of economic activity and other relevant variables, as profitability. Therefore, the variability of the NAIRU will be continuously affected by the path of the aggregate demand.

Even though standard macro models focused on the performance of the labor market do not allow for these types of relationships apart from the short run, the interrelations between consumption, investment and unemployment behind a negatively-sloped Phillips Curve in the medium and long run can be easily justified from standard economic theory.

3. The theoretical relationship between consumption, investment and unemployment

In this Section we provide the theoretical linkages between the three macroeconomic variables considered in the econometric model. Firstly, we consider the employment (and therefore, the unemployment) effects of changes in the aggregate demand. Next, we summarize the relationship between consumption and investment, focusing particularly on the effects of changes of the former on the latter. Finally, we analyze the role played by unemployment on consumption decisions.

⁵ The existence of such relationship is known in the literature as the *Modigliani Puzzle*. However, Modigliani himself does not regard it as a puzzle, but the natural expression of the Keynesian paradigm, Modigliani (2000).

According to the Keynesian view, increases in any of the aggregate demand components have positive effects on employment, because prices increase more than nominal wages, lowering thus the real wage. An alternative scenario, in which an increase in aggregate demand triggers, increase in production and employment would be that of sticky prices and wages, not responding thus to the changes in the aggregate demand.

The New Classical Macroeconomics (NCM) school (as the Neoclassical Synthesis had already done) accepts these explanations of the effect of aggregate demand on employment, and therefore on unemployment, but only for the short run. In the long run, when wages and prices are completely flexible and errors in expectations have been corrected, the real effects of changes in demand vanish, and the equilibrium in the labor market returns to the natural rate of unemployment.⁶

The New Keynesian Macroeconomics (NKM) School does not conclude either that changes in aggregate demand should have any significant employment effect in the long run. The equilibrium in the labor market, which corresponds to the NAIRU, is found when the level of employment that makes compatible the wage aspirations of workers in wage bargains and real wages that firms are willing to pay (given their labor costs and the degree of competition in product markets) is reached.

These approaches have, at least, two counterfactual implications. First, the effects of changes in aggregate demand should only be observed in the short run, i.e., they would not be persistent. Secondly, the variations in employment and in real wages should go in opposite directions, i.e., real wage should move counter-cyclically, precisely because it is the fall in real wages which triggers employment growth. However, available data suggest that movements in real wage are, in general, cyclical, and that, as we will show, the effects of changes in the aggregate demand have prolonged effects on employment and unemployment.

Let us use a rather simple framework to show how a change in aggregate demand may persistently affect employment. Assume that the equilibrium in the labor market is determined by the intersection of a labor demand curve, DL (which can represent either the marginal product of labor in a perfectly competitive context, or the relationship between real wages and demand for labor by imperfectly competitive firms fixing prices and employment for a given nominal wage), and a labor supply curve, SL (which can be the outcome of a leisure-income choice process in a perfectly competitive context, or the relationship between real wages and employment arising from a wage bargaining process between firms and labor unions), as Figure 1 shows. Departing from an initial equilibrium in point A, both the NCM and the NKM claim that given the labor demand curve DL , the only way to increase the equilibrium level of employment after an increase in aggregate demand is through a greater supply of labor at a lower real wage, reaching a new equilibrium in quadrant [II] of Figure 1, in A', for instance. This positive effect on employment will disappear when the real wage reverts to its initial value, once that the adjustment in wages and prices is complete, and/or when errors have been revised and expectations are correct.

However, it is possible to find an equilibrium in which the increase in aggregate demand implies a persistent increase in employment, compatible with a rise in real wages, i.e., graphically we would reach equilibrium in quadrant [I] in Figure 1. For this to occur it is necessary that as a result of the increased demand, the labor demand curve DL shifts rightwards (reaching an equilibrium in B, for instance), or that the labor supply curve SL shifts, assuming an upward sloping demand curve dI , reaching a new equilibrium at point C.

Lindbeck and Snower (1994) summarize the different transmission channels which must be open in each case for changes in aggregate demand to have persistent effects on the labor market. These channels make compatible an increase in employment with higher real wages, both in the medium run (when we assume that capacity is fixed, either fully utilized or under excess) and diminishing labor

⁶ If rational expectations were considered, the employment effects of expected changes in aggregate demand would be absent even in the short run, given that agents foresee perfectly the forthcoming increase in inflation, and adjust their labour market behavior immediately.

returns, as well as when full flexibility in the productive capacity is assumed (in the long run), with a perfect adjustment of capital stock.

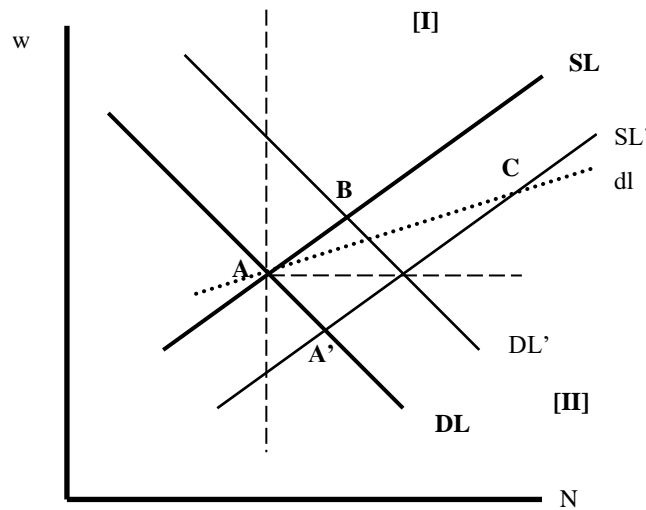


Figure 1. Effects of an increase in aggregate demand on employment

Let us assume that capital stock is given in the medium run and fully utilized. Thus, the production function of each of the F firms operating in the product market would be given by:

$$q = q(n), q_n > 0; q_{nn} < 0 \quad (1)$$

where q represents the production of each firm, n denotes their individual employment level and q_i is the partial derivative of q with respect to i -th production factor. Profit maximization by firms implies that aggregate employment in the economy, which is equal to the individual level of employment multiplied by the number of firms, is given by the usual negatively-sloped labor demand function:

$$N = FL \left(\frac{w}{1-m} \right); L' < 0 \quad (2)$$

where L is the inverse of the marginal product of labour (MP_N), w is the real wage and m is the Lerner index of monopoly power.

Given this labor demand function, an increase in aggregate demand will lead to greater employment without a fall in the real wage only if the labor demand curve shifts rightwards. Lindbeck and Snower (1994) show that this will happen if and only if as a result of the increase in aggregate demand monopoly power is reduced (due, for instance, to an increase in the total number of firms or an increased product demand price elasticity), or to an increase of the marginal product of labor. This rightward shift of the labor demand curve would also take place whether the capital stock is flexible, in the long run.⁷

If in the short and medium run we consider that there is excess of capacity, the increase in aggregate demand can also lead to a rightward shift of the labor demand curve if it triggers an increase in the marginal product of capital (MP_K). On the other hand, an increase in employment would be followed by an increase in capital utilization, and therefore the slope of the labor demand curve will not only depend on how will the MP_N react to the increased employment (negatively in the case of

⁷ Moreover, when capacity is flexible, the rightwards labour demand shift can also happen when, as a consequence of the increased aggregate demand, the user cost of capital falls, being capital and labour complementary, or the user cost of capital increases, being both production factor substitutive, but this effect is not the most relevant.

decreasing returns of labor), but also on how will the MP_K respond: it will increase if capital and labor are complementary. In this case, the production opportunities for each firm would be:

$$q \leq q(n, k), q_n > 0, q_k > 0, q_{nn} < 0, q_{kk} < 0 \quad (1')$$

The slope of the labor demand curve, in the presence of excess of capacity, is given by:

$$\frac{dw}{dN} = F(1-m)(q_m + \bar{h}q_{kn}), \quad (3)$$

where \bar{h} is the upper limit of the k/n ratio range chosen by the firms⁸.

Thus, in an imperfect competition context, if the degree of complementarity is high enough as to allow for a greater variation of the MP_K than the variation of the MP_N , the slope of the labor demand curve, dl , is positive, such that an increase in aggregate demand, which shifts the bargained real wage curve (or the labor supply curve), may increase the employment level without a reduction in real wages.

Following this line of reasoning, an increase in aggregate demand, due for instance to a greater investment in public infrastructures, would trigger in the short run an excess of capacity, which in turn, if labor and capital are complementary enough, would imply an upward sloping labor demand curve. This would increase employment, due to the shift to the right of the SN curve, without a reduction in the real wage. In the medium and long run, the labor demand curve DL would shift to the right as the marginal product of labor rises.

However, the employment effect would also be present and (as will be shown later) greater if the event that triggers the increase in aggregate demand is greater consumption. In this case, in addition to the direct effect of an increased consumption on employment, and in the absence of barriers to entry, more firms would enter in the market, and monopoly power would be reduced. This would shift in the medium run the labor demand curve to the right. Therefore, we may express the unemployment rate in each period t as a negative function of both realized consumption (C_t) and investment, I_t

$$u_t = u(C_t, I_t); u_C < 0, u_I < 0 \quad (4)$$

Consumption and investment are also intertwined. Particularly, the growth in consumption is likely to affect positively investment, which implies a second round effect on employment, with a subsequent further reduction in unemployment, given the increase in the marginal product of labor.

Firm i , who produces a good X , takes decisions on an investment project. Therefore, it will relate the decision with the cost of undertaking the project, which is normally defined by the user cost of capital, which we can proxy through the real interest rate (i) and with the expected return of the project, which will be directly related with the consumption demand that the firm expects for the good X . This demand, in turn, is affected by the business cycle, which we can proxy through the income level (or its growth). Therefore, at an aggregate level, investment will depend positively on consumption and income, and negatively on the interest rate:

$$I_t = I(Y_t; C_t; i_t); I_Y > 0, I_C > 0, I_i < 0 \quad (5)$$

Lastly, let us discuss the relationship between consumption and the unemployment rate. Consumption in each period depends negatively on the unemployment rate. According the life cycle

⁸ Firms choose, in a first stage, the capital stock level and technology (the k/n ratio) which maximize expected profits. In a second stage they fix the employment level, the production level and the price, given the available information on the rest of variables.

hypothesis (Ando and Modigliani, 1954, Modigliani and Brunberg, 1954, Modigliani, 1970) and the permanent income hypothesis (Friedman, 1957), individuals take decisions on consumption trying to maximize lifetime utility, which depends on the lifetime consumption they can afford to with their lifetime income and wealth. Thus, consumption in each period (which is aimed to be kept at a steady lifetime or slightly upward sloping path) depends on lifetime permanent income (or broad income) which includes present and future earnings derived both from labor and from real and financial assets.

The intertemporal utility maximization problem for the consumer, subject to the restrictions imposed by her lifetime expected income and wealth, and under standard assumptions, gives that consumption in each period is a function of present and future labour income, Y , and income from accumulated assets, W ,⁹

$$C_t = f(W_t; \sum_{s=0}^T E_t Y_{t+s}) \quad (6)$$

In order to proxy the expected future labor income, no doubt the main determinant for a great part of the workforce is the likelihood of being employed. This likelihood, in turn, may be proxied by the unemployment rate. The greater the unemployment rate, the lower the probability assigned by an individual to the likelihood of being employed in the future, and therefore the lower the future expected labor income, and consequently, current consumption¹⁰. Thus, we may establish a functional form between aggregate consumption in each period, C_t , and income (Y_t), wealth (W_t) and the unemployment rate (u_t):

$$C_t = C(Y_t; W_t; u_t) \quad C_Y > 0, C_W > 0, C_u < 0 \quad (7)$$

4. Econometric results

This section summarizes the specification and estimation of a macro econometric model, consisting in empirical versions of equations (4), (5) and (7), i.e., a multi-equational model, which tries to explain the interrelations between the three variables under scrutiny, consumption, investment and unemployment.

4.1. Data

The data used in our empirical analysis has been gathered from different statistical sources, which are detailed in Table A1 in the Appendix, providing also the corresponding definition for each variable. The reduced time dimension of some of the potentially important variables to explain the evolution of the variables of interest led us to make use of regional data, which allow outweighing the

⁹ The specification of the function depends on the assumptions on the utility function, the interest rate and the inter-temporal discount rate. For an individual living for T years, which leaves no debts, and assuming quadratic utility functions, real interest rates and inter-temporal discount rate equal to zero, and strictly positive marginal utility, the consumption function would be of the type (Hall, 1982): $C_t = \frac{1}{T} \left(W + \sum_{i=1}^T E_i(Y_i) \right)$

¹⁰ Note that this fall in current consumption implies an increase in current savings for precautionary reasons. There exists a vast literature focused on the effect of uncertainty about the evolution of expected future income on consumption and savings decisions (see *inter alia* the papers by Leland, 1968, Sandmo, 1970 or Drèze and Modigliani, 1972). This literature, however, has not yet got to a consensus as regard as how to measure this uncertainty, both at the micro and the macroeconomic level. Thus, some authors suggest the use of measures based on the volatility of future expected income (see Blanchard and Mankiw, 1988, Hahm, 1999, Hahm and Steigerwald, 1999 or Menegatti, 2007, 2010), while other group of authors base their attention on measures related to the unemployment (Dynarski and Sheffrin, 1987, Carroll, 1991, Malley and Moutos, 1996). More recent papers, as those of Mody *et al.*, (2012) or Bande and Riveiro (2012) take into account both type of measures in empirical models of precautionary savings. In any case, given that in the present paper we are interested in the effect of the probability of perceiving future income on current consumption decisions, we assume that this probability can be proxied correctly through the unemployment rate.

limited time dimension of some variables with the cross-section component, maximizing thus the available number of observations. For this reason, and given that there exist data for the 17 Spanish regions for the main macroeconomic figures (consumption, disposable income, gross fixed capital formation, the unemployment rate, etc.) we opted for a panel data approach. The criteria for choosing the data were, firstly, homogeneity, and secondly the time dimension. All of the variables have been deflated, in order to isolate from the effect of inflation on consumption and investment decisions, such that our estimated model is completely real. The sample is initially 1980 to 2007, but for some of the variables (for instance the Madrid stock index, which proxies financial wealth) there is only available data since 1985. In any case, in the estimation of the model we have adjusted the sample size of each equation to data availability.

4.2. Econometric methodology

We construct a structural vector autoregressive distributed lag model (VARDL), with the aim of explaining the dynamics of the three variables under study. Moreover, as we have mentioned, in order to maximize the available statistical information, this model will be estimated as a panel data model, using the breakdown of the 17 Spanish regions (*Comunidades Autónomas*). The specific functional form of the econometric model is:

$$A_0 y_{it} = \sum_{j=1}^p A_j y_{it-j} + \sum_{s=0}^q B_{it-s} X_{it-s} + \sum_{r=0}^k C_r Z_{t-r} + e_{it} \quad (8)$$

where y_{it} is a (3x1) vector of endogenous variables (consumption, investment and the unemployment rate), X_{it} is a vector of regional exogenous variables, while Z_t is a vector of exogenous national variables (which are common to all regions). Matrices A, B and C are of coefficients to be estimated, while e_{it} is a vector of error terms identically and independently distributed.

The estimation of model (8) is done by steps. Firstly, the dynamic structure of each equation is identified following the “general to specific” approach, i.e., we start with a high number of lags of each endogenous and exogenous variable, and then we reduce the model to a more parsimonious representation following the standard statistical information criteria, as the Akaike Information Criteria (AIC). This type of modelization implies a certain level of discretion in the selection of variables to include in each equation, as well as the initial number of lags to include. Vector Autoregressions (VAR’s), on the contrary, imply a minimum degree of discretion, given that the main decision in the modelization process is the ordering of the variables in the VAR, decision that conditions enormously the empirical results. For this reason, the econometric literature has developed the so-called Structural Vector Autoregression (SVAR), in which the atheoretical identification of the equations in the VAR is replaced by the imposition of an economic structure in the error terms. While the main advantage of the SVAR is the opportunity to conduct structural analysis, through inspection of the impulse-response functions, their main disadvantage is the individual equations have no economic interpretation, and are largely ignored.

VARDL models overcome these limitations of the SVAR models, given that the estimated coefficients in each of the equations can be directly interpreted as elasticities, which allow assessing the degree of plausibility and economic intuition of individual results in each equation. Moreover, this technique allows for the construction of impulse-response functions, whose shape is not dependent on the ordering of the variables within the model. For all these reasons we decided to construct our econometric model in terms of a VARDL¹¹.

As regards the type of panel data model we chose for our econometric exercise, we first must take into account the properties of the series as regards stationarity. The use of dynamic panel data models in the context of time series has generated an important debate in the literature. Banerjee (1999), Baltagi and Kao (2000) or Smith and Fuertes (2011) provide a good approximation to such debate.

¹¹ For a detailed account of ARDL for the analysis of long run relationships see Pesaran *et al.* (1996) and Pesaran and Shin (1999).

Whether the involved variables in the analysis are stationary or not conditions the type of econometric modelization to follow next (see Smith and Fuentes, 2011). Thus, if the variables are non-stationary (i.e., $I(1)$) we should first test for panel cointegration, and construct an error correction model if such cointegration exist, or estimate the model in first differences otherwise. If the variables are stationary, then we can proceed with the standard techniques for stationary panel data models (Baltagi, 2008).

Therefore, our second modeling stage is to test for unit roots in the variables of our model, both regional and aggregate. For the latter we have chosen the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test¹², even though results with alternative unit root tests, as the ADF, are similar to those reported¹³. Table 1 summarizes these results, from which we observe that for all of the national variables (financial wealth, GDP volatility, social security benefits, real short run interest rates and public debt/GDP ratio) we cannot reject the null hypothesis of stationary at the conventional statistical confidence levels.

Table 1. Unit root tests. National variables

Variable	KPSS
FW_t	0.053
$YVOL_t$	0.080
B_t	0.150
$RSHIR_t$	0.140
$DEBT_t$	0.160

Notes: The critical value for the test at the 5% is 0.14

Source: Author's own elaboration.

As regards the panel unit roots tests, among the different available options in the literature, we opted for the Maddala-Wu (1999) test, based on an exactly non-parametric test based on Fisher (1932). Specifically, the test statistic is $\lambda = -2 \sum_{i=1}^N \ln p_i$ which is distributed as a $\chi^2(2N)$, where p_i is the p-value of the ADF unit root test for each i -th cross section unit, $i=1, \dots, N$. This decision is based on the interesting characteristics of the test (see Maddala-Wu, 1999).

Table 2 summarizes the results of the test for the regional variables included in the model. Note that the null hypothesis is non-stationarity, and therefore the value of the statistic for each variable is greater than the critical value for a $\chi^2(34)$, which is approximately 48. On the light of these results we may conclude with sufficient statistical confidence that the regional variables involved in our model are panel-stationary, and therefore we may use standard stationary panel techniques.

Table 2. Panel unit root test

Variable	Fisher Statistic
C_{it}	62.17
Yd_{it}	52.28
NFW_{it}	114.63
U_{it}	47.65
Y_{it}	59.59
I_{it}	59.54

Source: Author's own elaboration.

¹² See Kwiatkowski *et al.* (1992).

¹³ We do not show these alternative tests for brevity, but they are readily available from the authors upon request.

Given these results we thus construct a panel VARDL model with regional fixed effects, through the following specification:

$$A_0 y_{it} = \sum_{j=1}^p A_j y_{it-j} + \sum_{s=0}^q B_{it-s} X_{it-s} + \sum_{r=0}^k C_r Z_{t-r} + e_{it} \quad (9)$$

$$e_{it} = \mu_i + v_{it}, i = 1, \dots, N, t = 1, \dots, T$$

In other words, we assume that the error term e_{it} follows a “one-way” error component, also known as a “fixed effects model”, in which $v_{it} \sim iid(0, \sigma^2)$ with $Cov(e_{it}, e_{jt}) = 0$ for $i \neq j$. The vector of scalars μ_i represents the specific regional effects, which we assume are constant through time. In other words, in this model we assume that regions exhibit a similar behavior as regards the slope coefficients for the different variables, and that they only differ in the intercept (Baltagi, 2008).

4.3. Econometric results

Once we have obtained the preferred dynamic specification for each equation in the model (estimated by OLS, see results in the Appendix, Table A2), we estimated the whole panel as a system, by Three Stages Least Squares, in order to take into account the potential endogeneity of some regressors and the cross-equation correlation. Table 3 summarizes the results of this estimation, which in general are good, being all of the variables statistically significant and all of the coefficients show the expected signs.

Column (1) in Table 3 shows the estimated consumption function. We observe that, in addition to a great level of inertia (value of the autoregressive coefficient of 0.87) disposable income affects consumption decisions with a high degree of persistence. Financial and nonfinancial wealth has the expected positive effects (greater in the case of non - financial wealth, which is reasonable in a period in which housing prices experienced a larger increase in returns than average financial assets). Lastly, the unemployment rate has a dampening effect on consumption, in line with our theoretical discussion in Section 2: an increase in the unemployment rate implies a decrease in expected future labor income, which in turn should be translated into reductions in current consumption. The inclusion of the public debt stock (as a % of GDP) in this equation has the purpose to test the Ricardian equivalence hypothesis, by which current tax cuts should be followed by current consumption falls, given that families anticipate the future tax increase to compensate current public deficit, and its corresponding increase in debt, rising their current savings to face such increase. The negative and statistically significant coefficient allows validating partially this hypothesis, even though with a limited impact, in line with previous studies for similar countries (see, for instance, Loayza *et al.*, 2000).

The results of the investment equation estimation are summarized in column (2) of Table 3. Investment shows a lower degree of inertia, depending negatively on current income, consumption (greater sales incentive firms to engage into investment projects), and negatively on short run interest rates (which proxy financial costs of the investment projects). We tried several alternative specifications for the investment function, including proxies for the Tobin’s q , or real long run interest rates, but none of them provided better statistical results. Lastly, the degree of macroeconomic uncertainty (proxies by the estimated volatility of aggregate GDP growth rate on the sample period, obtained from the estimation of a GARCH (1,1) model, see Table A1) affects negatively investment, being one of the variables (together with consumption) which exerts a greater contemporaneous impact on capital formation.

The estimation of the unemployment rate equation is summarized in column (3) of Table 3, and show results in line with previous literature. Firstly, unemployment exhibits a high degree of persistence¹⁴. Secondly, the aggregate demand variables show the expected signs (consumption and investment reduce the unemployment rate in the short run), while the aggregate supply variable (social

¹⁴ Note, however, that the unit root tests rejected the hypothesis that this series was $I(1)$, and therefore the hypothesis of pure hysteresis in the regional Spanish unemployment.

benefits) exerts the expected positive effect (increases in benefits tend to raise the reservation wage of workers, and therefore increases the rate of unemployment).

The model in Table 3 provides an excellent fit of the endogenous variables of the model, especially the unemployment rate¹⁵. Figure 2 depicts the actual and fitted values by the model. Note that the degree of fit to the actual values is remarkable, which indicates, on the one hand, that the dynamic specification of the model is adequate, and on the other hand, that the selected exogenous variables within each equation reflect well the underlying forces behind unemployment rate swings through time¹⁶.

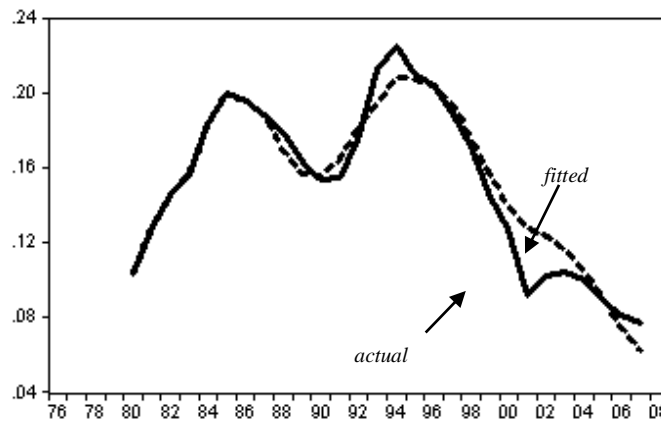


Figure 2. Actual and fitted unemployment rates.

Table 3. Model estimation. 3SLS

	(1) <i>Consumption</i>		(2) <i>Investment</i>		(3) <i>Unemployment</i>			
	Coef.	p-value	Coef.	p-value	Coef.	p-value		
C_{it-1}	0.878 (0.02)	0.00	I_{it-1}	0.701 (0.03)	0.00	u_{it-1}	0.78 (0.02)	0.00
Yd_{it}	0.214 (0.03)	0.00	y_{it}	0.404 (0.07)	0.00	I_{it}	-0.02 (0.01)	0.08
Yd_{it-1}	-0.17 (0.03)	0.00	ΔC_{it}	2.06 (0.07)	0.00	c_{it}	-0.593 (0.08)	0.00
ΔNFW_{it}	0.034 (0.008)	0.00	$RSHIR_t$	-0.234 (0.15)	0.09	c_{it-1}	0.555 (0.07)	0.00
Δu_{it}	-0.508 (0.09)	0.00	$\Delta YVOL_t$	-0.63 (0.43)	0.01	b_t	0.029 (0.01)	0.09
FW_t	0.022 (0.003)	0.00						
$DEBT_t$	-0.059 (0.01)	0.00						
R^2	0.99		R^2	0.99		R^2	0.93	

¹⁵ The aggregate unemployment rate is computed as the average of the regional unemployment rates.

¹⁶ Note that to obtain the fitted unemployment rate we first had to solve the model formed by the three estimated equations, allowing that the endogenous and exogenous variables take their initial values. We next solve dynamically the model, which implies that the model takes the actual values of the exogenous variables and computes the corresponding values for the endogenous variables, which in turn feed the model in the next period computation.

	(1) Consumption		(2) Investment		(3) Unemployment	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
SER	0.01		SER	0.06	SER	0.01
DW	1.93		DW	1.88	DW	1.88
Obs	374		Obs	374	Obs	374

Notes. Standard errors in parentheses. SER is the standard error of regression, while DW refers to the Durbin-Watson statistic.

Source: Author's own calculations.

5. Unemployment effects of consumption and investment shocks

With the model summarized in Table 3 we next run a number of dynamic simulations which aim at verifying our starting hypothesis, namely that changes in consumption patterns exert a direct effect (via aggregate demand) as well as an indirect effect (through investment) on unemployment. To this end we firstly compute the impulse-response functions associated with the model in Table 3, which inform us about the impact of innovations in the system on the endogenous variables. The IRF are computed by allowing the model to stabilize at its long run steady state, such that all exogenous variables are constant. Next, we impose a shock on each one of the equations and compute the response of the endogenous variables of the system to such shock (specifically, we consider the response to a one-off shock, an AR(0.4) and a AR(0.8) shocks)¹⁷. The results of the calculations are depicted in Figures 3 and 4.

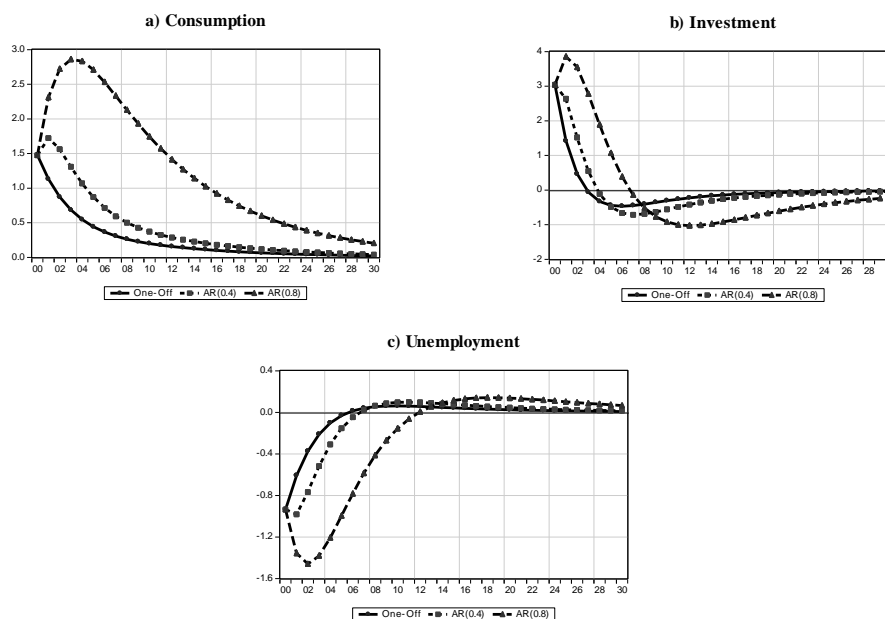


Figure 3. Impulse - Response functions to consumption shocks

¹⁷ A transitory (or one-off) shock is defined as a unitary exogenous change in the inspected equation (consumption, investment or unemployment), with a one year duration. In other words, the shock is present in period $t=0$, and disappears in period $t=1$. An AR(0.4) shock, in turn, is more persistent, since it takes value 1 in period $t=0$ and values $\varepsilon_t = 0.4\varepsilon_{t-1}$ for $t=1, 2, \dots, T$. Finally, the AR(0.8) shock takes value 0 for $t=0$ and $\varepsilon_t = 0.8\varepsilon_{t-1}$

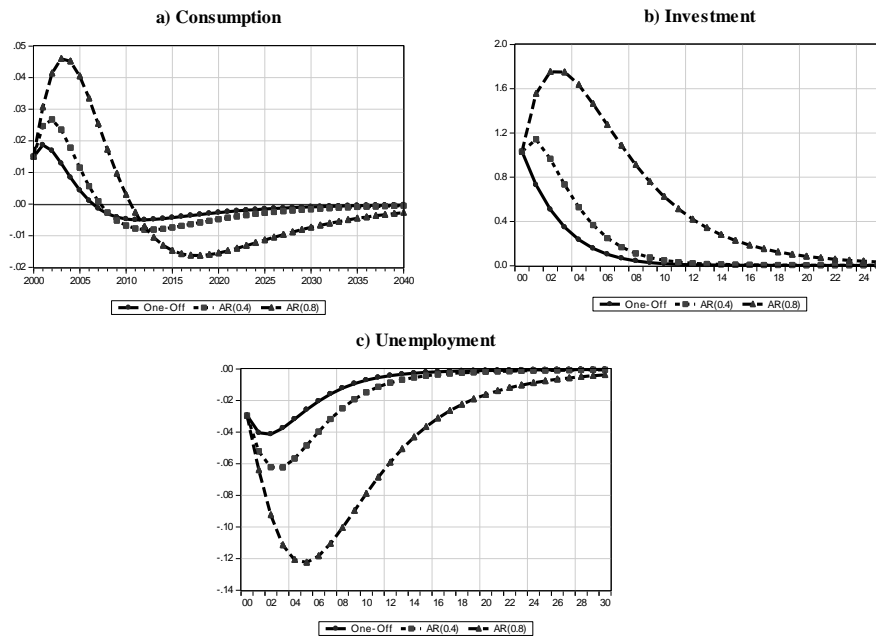


Figure 4. Impulse-Response functions to investment shocks

From the information in these graphs we may point that the first, shocks on consumption (regardless of the degree of persistence of the shock) exert an important effect on the unemployment rate, affecting also investment. Thus, when we consider a temporary one-off shock on consumption, there exists an important contemporaneous impact on investment (which is increased by more than a unit), which would indicate an accelerator effect. The unemployment rate, in turn, is reduced by 0.9 points contemporaneously, with a prolonged effect through 6 periods before reaching its initial value. Therefore, this IRF allows validating the hypothesis that changes in consumption affect unemployment through first and second round effects. Obviously, the more persistent is the shock on consumption, the greater the unemployment effects (see panel c) on Figure 3.

If we consider shocks on investment, the effects are similar; however the contemporaneous impact on the unemployment rate is lower than that of consumption shocks. In any case, an exogenous increase in investment is followed by further increases in consumption through the reductions in unemployment, with prolonged effects on the system.

A synthetic way of summarizing the information provided by the IRF is to calculate the accumulated impact of each shock on the endogenous variables in the long run. Assuming that the long run value of an endogenous variable is represented by x^{LR} (where x represents consumption, investment and the unemployment rate, respectively), let $\theta_t = x_t - x^{LR}$ be the difference between the actual value of variable x and its long run value in each period t , $t=1,2,\dots$ once that a shock in the system has occurred. If the shock took place in period $t=j$ then it is possible to compute the *accumulated short run effect* on variable x as:

$$x = \sum_{i=j}^n \theta_i \tag{10}$$

Note that this measure is the area below the IRF, therefore the greater the former, the larger the accumulated effect of a given shock on the variable under study. We may complement this measure with a temporal quantification of the shock. In this case, we would analyze the number of periods required for an endogenous variable to reach again its long run value (or a neighborhood of it). The first

type of measures will be referred to as *quantitative persistence*, while the latter will be referred to as *temporal persistence*. Table 4 summarizes these calculations¹⁸.

Table 4. Measures of quantitative and temporal persistence

	Consumption shock			Investment shock		
	Cons.	Invest.	Unemp.	Cons.	Invest.	Unemp.
Quantitative persistence (□)	8.25	0.00	-1.46	4.31	3.33	-0.31
Temporal persistence (□)	13	11	4	6	6	13

Notes: Cons., Invest. and Unemp. refer to consumption, investment and unemployment, respectively. Temporal persistence is computed as the number of periods required for the system to absorb 90% of the initial impact of the shock.

Source: Author's own calculations.

These results reinforce those provided by the IRF. The shocks generating more unemployment quantitative persistence are the consumption shocks, in spite of the larger effect in temporal terms of investment shocks. As regards the response of the two other endogenous variables, the quantitative effect on consumption of self and investment shocks is similar, while the self-effect of investment shocks is greater than consumption shocks.

In any case, these results suggest that should persistent falls in consumption levels occur (as it is the case in the Spanish economy), the unemployment rate would be largely and persistently affected, which would further complicate the labor market adjustment.

An additional exercise allows analyzing the effects on the equilibrium unemployment rate of *permanent* changes in consumption. The idea is to simulate what would happen with the equilibrium unemployment rate when a permanent fall in consumption or in investment levels occurs. Which of these aggregate demand shocks would affect unemployment most in the long run? To answer this question we use the model presented in Table 3 and introduce a permanent shock in the consumption equation and in the investment equation (in different simulations), and compute the responses of the unemployment rate, which are depicted in Figure 5.

From this figure we conclude that there are very different long run effects. Thus, a permanent unit shock on consumption increases equilibrium unemployment by 1.5 points, whereas in the case of investment shocks the unemployment rise is of 0.31, i.e., a permanent consumption shocks generates a long run effect which is 5 times larger than that of investment shocks. Secondly, the dynamic adjustment towards the new long run unemployment rate is remarkably different. In the short run, the unemployment rate overreacts to the consumption shock, increasing by 2.3 points, and then it progressively approaches its new long run value. In the case of an investment shock, the dynamic response is softer, approaching smoothly the new equilibrium unemployment rate. This indicates that in the case of consumption, the short run effects are greater than the long run effect, while the contrary holds for the investment shocks. This results calls for caution in the design of public budget adjustment policies, since any measure targeted at increasing public revenues taxing (and therefore lowering) consumption are likely to exert catastrophic effects on the equilibrium unemployment rate.

¹⁸ Given that we have considered three types of shocks, we should provide persistence measures for each. However, autoregressive shocks are persistent temporary shocks, and thus the persistence measures would only reflect an amplification of the effects of a temporary one-off shocks. For this reason we provide the results for this latter type of innovations.

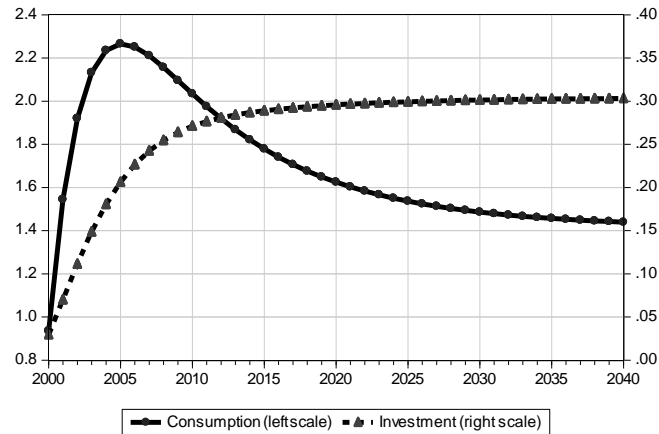


Figure 5. Impulse - Response functions to permanent shocks in consumption and investment

Conclusions

This paper provides new evidence as regards the existence of an empirical relationship between the main components of aggregate demand (consumption and investment) and the labor market equilibrium. Specifically, and taking into account that the main economic thought paradigms in macroeconomics (the New Keynesian Macroeconomics and the New Classical Macroeconomics) do not support the idea that aggregate demand shocks have prolonged labor market effects, we have shown that through a highly stylized macroeconomic model it is possible to establish a number of transmission mechanisms of aggregate demand shocks to the equilibrium level of employment, as a function of the adjustment of the capital stock and its level of utilization. In essence, this model indicates that if changes in the aggregate demand are associated to permanent shifts in the labor demand curve (due for instance to increases in the marginal product of labor or to an increase in the number of firms), there will be permanent effects on the equilibrium level of employment. These permanent effects would also be present if the labor demand function has positive slope and the change in aggregate demand affects the wage setting curve (or the labor supply curve). Combining this model with standard macroeconomics models of investment and consumption behavior allows us to establish a close relationship between consumption, investment and the labor market equilibrium (measured through the unemployment rate). The empirical evidence provided in Section 4 proves the existence of such relationship for the Spanish economy, while the dynamic simulations in Section 5 allowed quantifying the potential effects of demand shocks. Thus, we found that temporary shocks on consumption exert greater accumulated effects on unemployment than investment shocks, due to the feedback between both variables. In the presence of permanent consumption shocks, the equilibrium unemployment rate increases more than with investment shocks, as well as triggering stronger short run effects.

The implications for policy making are very relevant, especially in the current recessionary context of the Spanish economy, which is joined by a strong fiscal adjustment process. As in Malley and Moutos (2001), from our results we may deduce that any policy mix targeted at reducing the unemployment rate should include measures to incentive capital accumulation. In this sense, we agree with Kapadia (2005) in that policies fostering investment would help in reducing unemployment, and that in the case that policy focuses exclusively on labor market reforms, the effect on the employment level may be negative. In this same line, Arestis *et al.* (2007) conclude that policies should not be focused on the deregulation of the labor market and the promotion of flexibility, but should incentive sufficient capital accumulation.

Notwithstanding, from this paper we may also conclude that focusing exclusively on capital accumulation and leaving aside measures to stimulate aggregate consumption may not solve the labor market adjustment problem. Our empirical results suggest that current falls in consumption during the

present recession may generate a very strong effect on the unemployment rate, through the accumulated first and second round effects (via investment). At the same time, credit restrictions which are characterizing this turmoil will not allow for increases in investment, even with historically low real interest rates. Lastly, fiscal adjustment will lead to further falls in aggregate demand and tax rises, which will curtail disposable income even further. Therefore, the outlook as regards the evolution of the unemployment rate is quite pessimistic.

The negative recent behavior of the Spanish unemployment rate is, no doubt, the result of a series of unfavorable factors (excessive dependence of low-productivity sectors, high temporary employment rate, duality in the labor market, excessive rigidities in the wage bargaining processes, etc.), but the insufficient private spending in consumption and investment, which far from being outweighed by public spending, has been reinforced by recent public budget adjustment plans, has contributed to amplify the magnitude of the problem in recent years. It seems clear that the chronic unemployment problem in Spain (and its deterioration in the last years) is not uniquely attributable to labor market institutions and regulations. Therefore, any measure focused on those aspects, affecting negatively consumption and investment will not be able to solve the unemployment problem.

Measures targeted at increasing aggregate demand components without compromising the public budget balance are, therefore, needed. In this sense, a deep reform of the tax system which lowers tax pressure on the income levels with greater propensity to consume would be an adequate stimulus to start with the multiplier effects. At the same time, deepening into the financial system reform is essential to revert credit flows towards the real sector of the economy, such that economic activity starts creating employment again.

Note that in the context of a monetary union there would be an additional adjustment mechanism, through an internal devaluation via wage cuts that if the inflation rate is to be kept stable, should be achieved through nominal wage reductions. However, our results show that this type of adjustment, being an attack to the welfare system, also would be associated to falls in the disposable income of households, with a likely deterioration of the unemployment problem. Therefore, these types of measures should be avoided by policymakers. We hope that in this context, the option of fostering labor supply reductions via external out-migration (which seems to be already in place) instead of via employment creation is not chosen by policy makers as the via to solve the labor market adjustment problem in Spain.

Acknowledgements

Authors acknowledge the excellent research assistance by Carla di Paula, as well as comments on a previous version of the paper from other members of the GAME research group and from Alberto Meixide. Remaining errors are our sole responsibility. The research has been funded by Xunta de Galicia, through grant 10SEC242003PR, whose financial support is gratefully acknowledged.

References

- [1] Alexiou, C. and Pitelis, C. (2003). On capital shortages and European unemployment: a panel data investigation, *Journal of Post Keynesian Economics*, 25(4): 613-631.
- [2] Ando, A. and Modigliani, F. (1996). The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests, *American Economic Review*, 53: 55-84.
- [3] Arestis, P. Baddeley, M. and Sawyer, M. (2007). The relationship between capital stock, unemployment and wages in nine EMU countries, *Bulletin of Economic Research*, 59(2): 125 -148.
- [4] Baltagi, B. H. and Kao, C. (2000). Nonstationary Panels, Cointegration in Panels and Dynamic Panels: A Survey, *Advances in Econometrics*, 15: 7-51.
- [5] Baltagi, B.H. (2008). *Econometric Analysis of Panel Data*, New York: Wiley.

- [6] Bande, R. and Karanassou, M. (2013). The Natural Rate of Unemployment Hypothesis and the Evolution of Regional Disparities in Spanish Unemployment. *Urban Studies*, forthcoming.
- [7] Bande, R. and Riveiro, D. (2012). Private Savings and Macroeconomic Uncertainty: Evidence from Spanish Regional Data, MPRA Paper 42647, University Library of Munich, Germany.
- [8] Banerjee, A. (1999). Panel Data Unit Roots and Cointegration: An Overview, *Oxford Bulletin of Economics and Statistics*, Special Issue, 607-629.
- [9] Blanchard, O.J. and Mankiw, N.G. (1988). Consumption: Beyond Certainty Equivalence, *American Economic Review, Papers and Proceedings*, 78: 173-177.
- [10] Blanchard, O.J. and Summers, L. (1987). Hysteresis and the European Unemployment Problem. *NBER Macroeconomics Annual*, 1: 15-77.
- [11] Carroll, C.D. (1992). The Buffer-Stock Theory of Savings: Some Macroeconomic Evidence, *Brookings Papers on Economic Activity*, 2: 61-135.
- [12] Drèze, J. and Modigliani, F. (1972). Consumption decisions under uncertainty, *Journal of Economic Theory*, 5: 308-335.
- [13] Dynarski, M. and Sheffrin, S. (1987). Consumption and unemployment, *Quarterly Journal of Economics*, 102: 411-428.
- [14] Fisher, R.A. (1932). *Statistical Methods for Research Workers*, Edinburgh: Oliver & Boyd.
- [15] Friedman, M. (1957). *A Theory of the Consumption Function*, Princeton University Press.
- [16] Friedman, M. (1968). The Role of Monetary Policy, *American Economic Review*, 58: 1-17.
- [17] Hanm, J.H. (1999). Consumption Growth, Income Growth and Earnings Uncertainty: Simple Cross - Country Evidence, *International Economic Journal*, 13: 39-58.
- [18] Hanm, J.H. and Steigerwald, D.G. (1999). Consumption Adjustment under Time-Varying Income Uncertainty, *Review of Economics and Statistics*, 81: 32-40.
- [19] Kapadia, S. (2005). The Capital stock and equilibrium unemployment: a new theoretical perspective. *Balliol College, University of Oxford. Department of Economics*, Discussion Paper 181.
- [20] Karanassou, M., Sala, H. and Savador, P. (2008). Capital Accumulation and Unemployment: New Insights on the Nordic Experience, *Cambridge Journal of Economics*, 32: 977-1001.
- [21] Karanassou, M. and Sala, H. (2012). Productivity Growth and the Phillips Curve: A Reassessment of the US Experience, *Bulletin of Economic Research*, 64: 344-366.
- [22] Karanassou, M., Sala, H. and Snower, D.J. (2010). Phillips Curves and Unemployment Dynamics: A Critique and a Holistic Perspective, *Journal of Economic Surveys*, 24: 1-51.
- [23] Kwiatkowski, D., Phillips, P. C. B., Schmidt, P. and Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: how sure are we that economic time series are non - stationary?, *Journal of Econometrics*, 54: 159-178.
- [24] Layard, R., Nickell, S. and Jackman, R. (1991). *Unemployment: Macroeconomic Performance and the Labour Market*. Oxford University Press, Oxford.
- [25] Leland, H. (1968). Saving and Uncertainty: The Precautionary Demand for Saving, *Quarterly Journal of Economics*, 82: 465-473.
- [26] Lindbeck, A. and Snower, D.J. (1987). Union Activity, Unemployment Persistence and Wage-Employment Ratchets, *European Economic Review*, 31: 157-167.

- [27] Lindbeck, A. and Snower, D.J. (1994). How Are Product Demand Changes Transmitted to the Labour Market?, *Economic Journal*, 104 (March): 386-398.
- [28] Loayza, N., Schmidt-Hebbel, K. and Servén, L. (2000). What drives private saving rates across the world?, *Review of Economics and Statistics*, 82(2): 165-181.
- [29] Maddala, G. S. and Wu, S. (1999). A comparative Study of Unit Root Tests with Panel Data and a New Simple Test, *Oxford Bulletin of Economics and Statistics*, Special Issue, 631-652.
- [30] Malley, J. and Moutos, T. (1996). Unemployment and Consumption, *Oxford Economic Papers*, 48: 584-600.
- [31] Malley, J. and Moutos, T. (2001). Capital Accumulation and Unemployment: A Tale of two Continents, *Scandinavian Journal of Economics*, 103(1): 79-99.
- [32] Menegatti, M. (2007). Consumption and Uncertainty: a Panel Analysis in Italian Regions, *Applied Economics Letters*, 14: 39-42.
- [33] Menegatti, M. (2010). Uncertainty and Consumption: New Evidence in OECD Countries, *Bulletin of Economic Research*, 62(3): 227-242.
- [34] Modigliani, F. and Brumberg, R. (1954). Utility Analysis and the consumption function: an interpretation of cross-section data. In Kurihara, K.K. (Ed.), *Post-Keynesian Economics*. Rutgers University Press, New Brunswick, 388-436.
- [35] Modigliani, F. (1970). The life-cycle hypothesis and inter country differences in the saving ratio in W. A. Eltis, M. FG. Scott, and J. N. Wolfe, (Eds.), *Induction, growth, and trade: essays in Honor of Sir Roy Harrod*. Oxford University Press, Oxford, 197-225.
- [36] Modigliani, F. 2000. Europe's Economic Problems. Prepared for *Testimony before the Monetary Committee of the European Central Bank*. Mimeo.
- [37] Mody, A., Ohnsorge, F. and D. Sandri (2012). Precautionary Savings in the Great Recession. *IMF Working Paper*, WP12/42.
- [38] Pesaran, H., Shin, Y. and Smith R. (1996). Testing for the Existence of a Long Run Relationship". *DAE Working Paper* 9622, University of Cambridge.
- [39] Pesaran, H. and Shin, Y. (1999). An Autorregressive Distributed Lag Modelling Approach to Cointegration Analysis, in S. Strom (Ed.), *Econometrics and Economic Theory in 20th Century: The Ragnar Frisch Centennial Symposium*, Cambridge. Cambridge University Press, 371-413.
- [40] Rowthorn, R. (1999). Unemployment, Wage Bargaining and Capital-Labour Substitution, *Cambridge Journal of Economics*, 23(4): 413-425.
- [41] Sandmo, A. (1970). The Effect of Uncertainty on Savings Decisions, *Review of Economic Studies*, 37: 353-360.
- [42] Smith, R. and Fuertes, A.M. (2011). Panel Time Series. Mimeo.

APPENDIX

Table A1. Definitions and data sources

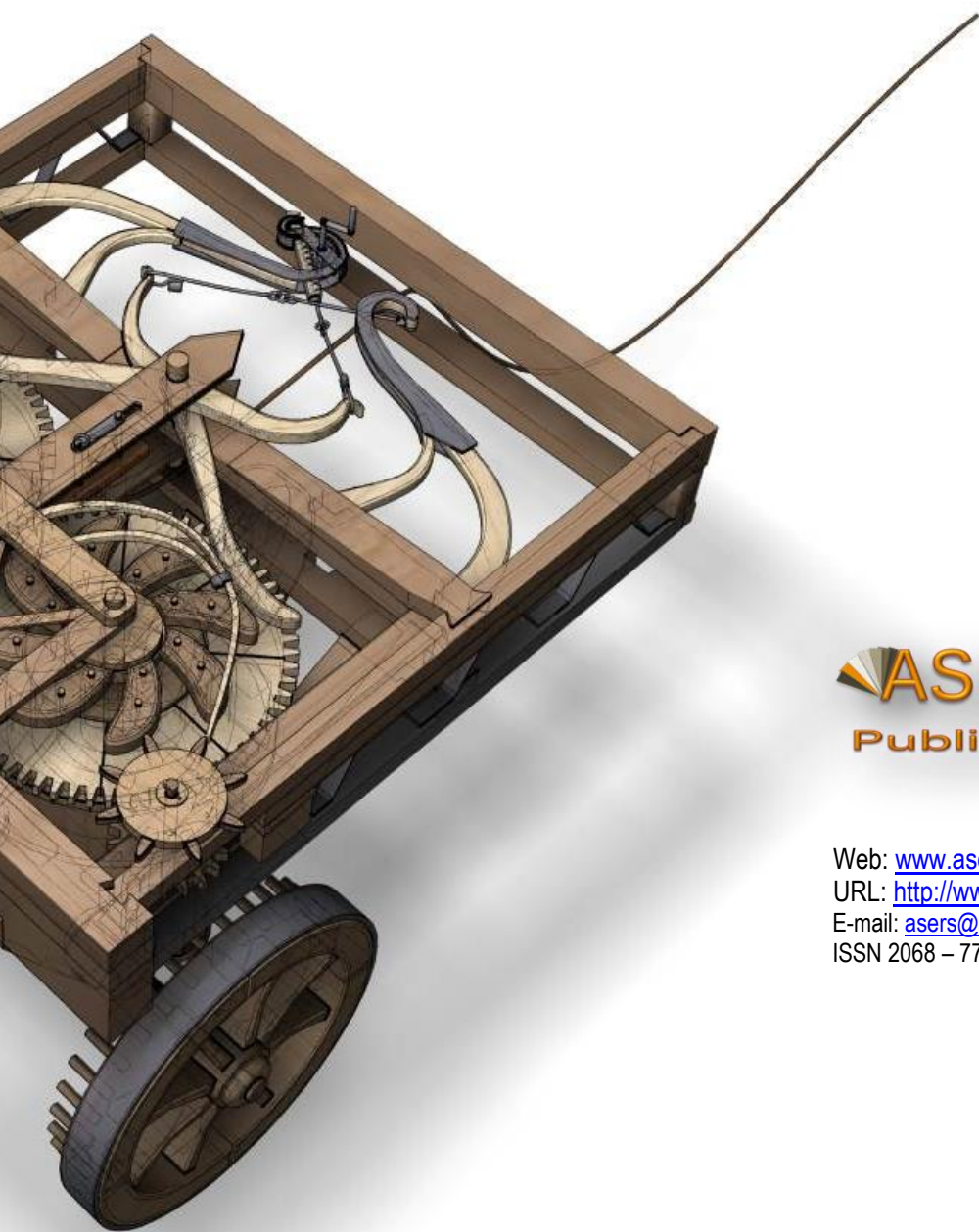
	Variable	Definition	Source
REGIONAL VARIABLES	C_{it}	Final consumption expenditure by households	BD-MORES, Dirección general de Presupuestos, Instituto de Economía Internacional, University of Valencia
	Yd_{it}	Gross household disposable income	BD-MORES
	Y_{it}	GDP at market prices	BD-MORES
	I_{it}	Gross Fixed Capital Formation	BD-MORES
	u_{it}	Regional unemployment rate	Labour Force Survey (EPA), INE
	NFW_{it}	Non financial wealth: value of the residential capital stock= residential capital stock x average price of squared meter of real estate	<ul style="list-style-type: none"> ▪ Residential capital stock: IVIE, University of Valencia; ▪ Averag esq. M. Price: Sociedad de Tasación.
NATIONAL VARIABLES	FW_t	Financial wealth: anual average of the Madrid stock index	Madrid Stock
	B_t	Social benefits per inhabitant	OCDE, Economic Outlook
	$RSHIR_t$	Real short run interest rate: nominal short run interest rate-rate of inflation	OCDE, Economic Outlook
	$DEBT_t$	Public debt stock as a % of GDP	OECD, Economic Outlook

Table A2. Estimation of the model. OLS

Consumption			Investment			Unemployment		
	Coefficient	p-value		Coefficient	p-value		Coefficient	p-value
C_{it-1}	0.844 (0.02)	0.00	I_{it-1}	0.754 (0.02)	0.00	u_{it-1}	0.75 (0.02)	0.00
Yd_{it}	0.326 (0.04)	0.00	y_{it}	0.321 (0.05)	0.00	I_{it}	-0.033 (0.007)	0.00
Yd_{it-1}	-0.270 (0.04)	0.00	C_{it}	1.51 (0.15)	0.00	C_{it}	-0.243 (0.03)	0.00
NFW_{it}	0.042 (0.01)	0.00	$RSHIR_t$	-0.352 (0.15)	0.02	C_{it-1}	0.196 (0.03)	0.00
u_{it}	-0.141 (0.04)	0.01	$YVOL_t$	-0.856 (0.59)	0.10	b_t	0.068 (0.01)	0.00
FW_t	0.030 (0.003)	0.00						
$DEBT_t$	-0.06 (0.05)	0.00						
R^2	0.99		R^2	0.99		R^2	0.94	
SER	0.01		SER	0.07		SER	0.01	
DW	2.05		DW	2.12		DW	1.94	
NxT	374		NxT	459		NxT	459	

Notes. Standard errors in parentheses. SER is the standard error of regression, while DW refers to the Durbin-Watson statistic.

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ISSN 2068 – 7710