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Accounting Spanish business cycles: What can be learned from past recessions?

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Abstract: We apply the business cycle methodology proposed by Chari, Kehoe, and McGrattan (2007) to identify the sources of Spanish business fluctuations during two outstanding cyclical episodes: the recession alongside the inception of democracy on 1977, and the recession of 2008. We find that the labor wedge is the key element behind these fluctuations, and that both taxes and labor market institutions are likely behind the wedge movements. Our conclusion suggests that any model that tries to understand the causes of the recessions occurred in the last three decades should focus on the labor wedge. This conclusion holds regardless the framework assumes a closed economy or an open economy.

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1 Introduction

In this paper we apply the *business cycle accounting* methodology (BCA) proposed by Chari, Kehoe, and McGrattan (2007, hereafter CKM) to analyze two outstanding recessions occurring in Spain since 1976: the transition to democracy on 1976, and the recession of 2008. The BCA uses the equilibrium conditions of a prototype DSGE closed economy model to identify the main distortions that account for movements in output and hours worked per capita, as well as in investment as a percentage of output.[1] These distortions can be classified in four categories: (i) those affecting the resource constraint of the economy, the feasibility wedge; (ii) those affecting the production function of the economy, the efficiency wedge; (iii) those affecting the intratemporal condition that substitutes consumption and leisure, the labor wedge; and (iv) those affecting the intertemporal substitution of consumption, the investment wedge. This analysis is extended using a small open economy framework following the BCA version proposed by Lama (2011), who suggests a bond wedge that affects the trade balance.

Our main findings are as follows. *First*, the labor wedge is key when accounting for Spanish business cycles. This conclusion holds both for the standard BCA and for the small open economy version. The role of the labor wedge can be explained on the basis of the inception of the Welfare State in Spain during the democracy period after 1975: there was a notorious increase in both the level of taxation, unemployment protection, and union coverage. Two labor market reforms, implemented on 1984 and 1997, were aimed to protect permanent workers and increase the flexibility to fire temporary workers. Although the goods markets have become more flexible, there is a wide consensus that this liberalization has been insufficient in many sectors.

Second, regarding the efficiency wedge, a complementary growth accounting exercise reveals that the trend component in total factor productivity (TFP) suffered a dramatic change after the mid 1990s. The role of efficiency should not be regarded as a cyclical phenomenon, but as a permanent component.

We should add a word of caution: our results include data and information as of the 4th quarter of 2009. The episodes occurring after this date are not considered for the evaluation of the current recession, as for instance, the financial turmoil of May 2010.

The rest of the paper is organized as follows. Section 2 provides some Spanish business cycle

[1] Applications of this methodology include those of Ahearne, Kydland, and Wynne (2006) for Ireland, and Kobayashi and Inaba (2006) for Japan.

facts: we perform a growth accounting exercise which allows us to identify trends in productivity, hours worked, and efficiency of capital-labor utilization. We then use standard filtering techniques to identify the business cycles in Spain's recent history. Section 3 offers a brief description of the BCA methodology, which is then put to use in Section 4. Finally, Section 5 puts forward some policy implications and concludes.

2 Some Spanish business cycle facts

In this section we study some properties of economic growth and employment. We also characterize the cyclical phases of the period under consideration, 1976:3-2009:4, after using a Hodrick-Prescott (HP) filter. An appendix describes the data and the construction of the variables used in the exercise.

2.1 A growth accounting exercise

We first describe the evolution of output per capita—measured as gross value added (GVA) per population over 16—and labor productivity (GVA per worker) across the sample. Using a Cobb-Douglas production function, output per capita can be decomposed in the following way:[2]

$$\frac{Y_t}{P_t} = \frac{Y_t}{L_t} \times \frac{L_t}{N_t} \times \frac{N_t}{P_t} \tag{1}$$

where Y_t denotes output, P_t is the population over 16, L_t is the number of employed workers, and N_t denotes the total labor force. Equation (1) says that output per capita can be decomposed as the product of three components: output per worker Y_t/L_t (labor productivity), the employment rate L_t/N_t, and the participation rate N_t/P_t. In turn, output per worker can be decomposed as

$$\frac{Y_t}{L_t} = A_t \times \left(\frac{K_t}{L_t}\right)^{\theta} h_t^{1-\theta} \tag{2}$$

where A_t represents total factor productivity (TFP), K_t is the capital stock, and h_t denotes the average hours worked per worker. (Therefore, $h_t L_t$ equals the total number of hours worked.) Equation (2) says that labor productivity can be decomposed into total factor productivity and the contributions from the capital-to-labor ratio and from hours worked per worker.

[2] See Kehoe and Prescott (2007) for several applications of the growth accounting methodology.

In Figure 1,[3] the growth rate of output per capita accelerates after Spain joins the European Economic Community (EEC) in 1986 (increasing from 0.1% to 1.8%, see also Table 1 below); the rate has remained stable until the end of the sample. (The first observation in all series is normalized to unity.) Labor productivity shows a different pattern. While enjoying a high growth rate (2.9%) at the beginning of the sample, productivity slows down after 1986; the growth rate has become negative after 1995. Regarding TFP, two phases are evident. The first starts on 1976:3 and lasts up to 1994:4; this phase enjoys a positive growth rate. The second one, which is ongoing, is characterized by a deceleration of the growth rate, turning negative in recent years.[4]

Table 1: Output per capita growth decomposition

	1976:3-1985:4	1986:1-1994:4	1995:1-2009:4	1976:3-2009:4
Output per worker ($a = a_1 + a_2 + a_3$)	2.94%	1.72%	-0.38%	1.15%
TFP (a_1)	2.26%	1.09%	-0.54%	0.72%
Capital-to-labor (a_2)	1.61%	0.76%	0.15%	0.74%
Hours per worker (a_3)	-0.93%	-0.14%	0.00%	-0.30%
Employment rate (b)	-2.12%	-0.32%	1.00%	-0.27%
Participation rate (c)	-0.72%	0.45%	1.20%	0.43%
Output per capita ($a + b + c$)	0.10%	1.85%	1.82%	1.31%

The decomposition exercise in Table 1 shows that most of the long-run evolution in labor productivity can be accounted by a change in TFP, with the capital-to-labor ratio playing an important role too. For 1976:3-1985:4, capital-to-labor growth accounts for a sizable fraction of productivity growth; as the Spanish economy opened after its EEC entry, the role of capital has become smaller over time, mostly due to the increased capital inflows. Note also that the contribution of hours worked per worker was negative during the first period and negligible after 1986.

Rows 5 and 6 in Table 1 show that the growth rates of the employment rate and the activity rate have accelerated in recent years. We conclude that output per capita growth has been sustained

[3] Using the EU KLEMS database we calibrate a capital income share of $\theta = 0.3638$.

[4] The 1994 productivity downturn has been documented by several authors; see, for example, Mas and Quesada (2006), Jimeno, Moral, and Saiz (2007), and Dolado and Stucchi (2008).

due to (i) the increase in the participation rate N_t/P_t after 1986, and (ii) the increase in the employment rate L_t/N_t after 1995.

2.2 Identifying Spanish business cycles

Figure 2 plots the HP-filtered output per capita using a value of $\lambda = 1600$. This allows us to identify three cycles, described below. First, a long recession from 1981:1 through 1987:2, the period where the Spanish economy underwent its major structural reforms (like the entry into the EEC and the consolidation of democracy). Although output fluctuated above its trend at the beginning of the sample, output per capita is flat during these years (see also Figure 1); for this reason, we prefer to analyze the period of transition to democracy, 1976:1-1985:4. This recession has an associated expansion which concludes in 1992:1. The expansion takes place at the time of the EEC entry and the European Single Act.

We identify a second recession lasting from 1992:2 to 1994:4; this downturn also affected the rest of the European countries. There is an expansion that coincides with the launching of the euro, from 1999:1 through 2001:4. Finally, we identify the current recession, which for Spain begins in 2008:2 (after a peak in 2007:2). We apply the BCA methodology to analyze the first and the last of these three recessions: the transition to democracy recession on 1976, and the recession of 2008.

2.3 Hours worked and employment

Hours per capita $h_t L_t/P_t$ can be decomposed as the product of hours per worker, the employment rate, and the participation rate, as shown below:

$$\frac{h_t L_t}{P_t} = h_t \times \frac{L_t}{N_t} \times \frac{N_t}{P_t}.$$

These series provide different information about the decision to participate in the labor market.

Figure 3 presents the evolution of the weekly average hours per worker h_t, together with the hours per capita $h_t L_t/P_t$, and the hours per total labor force, $h_t L_t/N_t$ (the first observation in all series is normalized to unity, 1976:3 = 1). There is a notorious fall in hours per worker from the mid seventies until the mid eighties. Both hours per capita and hours per labor force declined between 1976 and 1986 due to a fall in the participation rate and an increase in the unemployment rate. After a swing alongside the expansion at the end of the eighties, both series display an upward

trend, which has somewhat reversed in the last quarters of the sample.

Figure 3 also plots the participation rate and the employment rate (again, the first observation in both series is normalized to unity). The participation rate slightly declines in the first ten years of the sample, and experiences a sluggish recovery from 1987 to 1996 (which can be accounted by the increase of female participation in the labor market) and a vigorous one during the last years of the sample (due to an increase in the female and immigrants' participation). The employment rate reflects the evolution of the cycle described above. During the last quarters, the pattern of this relation has changed: the participation rate continues to grow while the employment rate declines.

3 The BCA methodology

In this section we present a brief description of the BCA methodology.[5] In a nutshell, the BCA methodology has two components, an *equivalence result* and an *accounting procedure*. The equivalence result shows that a large class of models are equivalent to a prototype model—a standard stochastic growth model—with various types of time-varying wedges that distort the equilibrium decisions of agents. The accounting procedure consists of two steps. First, using data and the equilibrium conditions of the prototype model, it measures the wedges. Second, wedge values are fed back to the prototype model, quantifying how much of observed movements in output, labor, and investment (all in per capita terms) can be attributed to each wedge.

3.1 The benchmark prototype economy

The prototype economy is composed of a representative household of size N_t, a representative firm, and a government. The mass of population is assumed to grow at a constant rate n. At each period t, the economy experiences one of many states denoted by s_t. Denote the history of said states by $s^t = \{s_0, \ldots, s_t\}$. Let $\pi_t(s^t)$ be the time-0 probability of history s^t. We take the initial state s_0 as given.

The economy has four exogenous stochastic wedges: efficiency $A_t(s^t)$, labor $1 - \omega_{lt}(s^t)$, investment $1/(1+\omega_{xt}(s^t))$, and feasibility $g_t(s^t)$ (also labeled as government consumption wedge in CKM). Note that these variables are functions of the state s_t.

A discretionary expansion of government spending or a shock affecting the trade balance are examples of the feasibility wedge. A shock that makes total factor productivity differ from its trend

[5] See also the technical appendix contained in Chari, Kehoe, and McGrattan (2006).

can be identified as a shock to the efficiency wedge. Examples of the labor wedge may include (*a*) indirect taxation of consumption or direct taxation of labor income (or a combination of both) that affect the slope of the budget and the substitution between consumption and leisure; (*b*) labor market institutions that alter the number of hours worked (days of vacations, holidays) and/or the decision to participate in the labor market, as for instance, the reservoir wage of female workers; or (*c*) institutions that cause the real wage to move rigidly in response to a negative productivity shock, as for instance the market power of unions and firms. Finally, an example of the investment wedge is taxation of capital income which distorts the marginal product of capital.

Household The representative household of this economy chooses sequences of per capita consumption c_t, labor l_t, and investment x_t to maximize its infinite lifetime expected utility

$$\sum_{t=0}^{\infty} \sum_{s^t} \beta^t \pi_t(s^t) U(c_t(s^t), l_t(s^t)) N_t, \tag{3}$$

subject to the budget constraint

$$c_t(s^t) + (1 + \omega_{xt}(s^t)) x_t(s^t) = (1 - \omega_{lt}(s^t)) W_t(s^t) l_t(s^t) + R_t(s^t) k_t(s^{t-1}) + T_t(s^t) \tag{4}$$

and the law of motion for the per capita capital stock k_t

$$(1 + n) k_{t+1}(s^t) = (1 - \delta) k_t(s^{t-1}) + x_t(s^t). \tag{5}$$

Notation is standard: β is a discount factor, W_t is the real wage rate, R_t is the rental price of capital, T_t are per capita transfers and δ is the depreciation rate.

Firm The representative firm has access to a constant returns to scale technology

$$A_t(s^t) F(k_t(s^{t-1}), z_t l_t(s^t)), \tag{6}$$

where $z_t \equiv (1+\eta)^t$ is labor-augmenting technical progress which grows at rate η. We assume that the firm maximizes profits: it chooses sequences of capital and labor input to maximize

$$A_t(s^t) F(k_t(s^{t-1}), z_t l_t(s^t)) - W_t(s^t) l_t(s^t) - R_t(s^t) k_t(s^{t-1}). \tag{7}$$

It is easy to verify that a competitive equilibrium is characterized by four equations. First, a

resource constraint, affected by the wedge $g_t(s^t)$:

$$y_t(s^t) = c_t(s^t) + x_t(s^t) + g_t(s^t). \tag{8}$$

We refer to (8) as the feasibility (rather than government) wedge given that it is also influenced by the trade balance.[6] Second, the production technology, affected by the efficiency wedge $A_t(s^t)$:

$$y_t(s^t) = A_t(s^t)F(k_t(s^{t-1}), z_t l_t(s^t)). \tag{9}$$

We add an intratemporal condition, affected by the labor wedge $\omega_{lt}(s^t)$

$$-\frac{U_{lt}(s^t)}{U_{ct}(s^t)} = (1-\omega_{lt}(s^t))A_t(s^t)z_t F_{l,t}(s^t), \tag{10}$$

and an intertemporal Euler equation, affected by the investment wedge $\omega_{xt}(s^t)$:

$$(1+\omega_{xt}(s^t))U_{ct}(s^t) = \beta \sum_{s^{t+1}} \pi_t(s^{t+1}|s^t)U_{c,t+1}(s^{t+1}) \left[A_{t+1}(s^{t+1})F_{k,t+1}(s^t) + (1-\delta)(1+\omega_{x,t+1}(s^{t+1}))\right]. \tag{11}$$

3.2 The accounting procedure

If the state s^t were known, so would the wedges. However, a prior knowledge of the state and its associated probability process is not possible. Hence, some preliminary work is required.

Functional forms and decision rules To make the accounting procedure operational, we select functional forms for the utility function and the production technology. These choices are standard in the literature. We assume that the utility function takes the logarithmic form

$$U(c,l) = \log c + \psi \log(1-l),$$

and the production technology follows a Cobb-Douglas specification

$$F(k,l) = k^{\theta}(zl)^{1-\theta}.$$

After substitution of these functional forms, it is possible to take the system formed by (8)–(11) and derive (log-linear) decision rules. Denote these rules by $y(s_t, k_t)$, $l(s_t, k_t)$ and $x(s_t, k_t)$.

[6] In Spain, exports and imports represent an important percentage of GDP.

Estimating the transition process Assume that s^t follows a Markov process of the form $\pi(s_t|s_{t-1})$, and that the map from s^t to the wedges is both one to one and onto. Thus, without loss of generality let $s_t \equiv (s_{At}, s_{lt}, s_{xt}, s_{gt})$; also, set $A_t(s^t) = s_{At}$, $\tau_{lt}(s^t) = s_{lt}$, $\tau_{xt}(s^t) = s_{xt}$, and $g_t(s^t) = s_{gt}$.

In what follows, let y_t^d, l_t^d, x_t^d and g_t^d denote observed data. We use these values to estimate the parameters of the Markov process $\pi(s_t|s_{t-1})$. For this purpose, we specify a VAR for s_t of the form

$$s_{t+1} = P_0 + P_1 s_t + \epsilon_{t+1}, \tag{12}$$

where ϵ is iid normal with mean zero and variance-covariance matrix V (to ensure that V is positive semidefinite, we actually estimate the lower triangular matrix Q, where $V = QQ^\top$).

We use a standard maximum likelihood estimation procedure to obtain estimates of P_0, P_1, and V of process (12). For this estimation we use both observed data and the model's decision rules outlined above.

Uncovering the state The next step is to identify the state s_t by measuring the realized wedges. We can directly measure the government consumption wedge as the sum of (observed) government spending plus net exports. The remaining wedges are obtained using the observed data and the model's decision rules: the realized wedge series s_t^d should solve

$$y_t^d = y(s_t^d, k_t), \quad l_t^d = l(s_t^d, k_t), \quad x_t^d = x(s_t^d, k_t), \tag{13}$$

where k_t follows from equation (5) using the values for x_t^d and a period-0 (observed) capital stock k_0^d. We solve for the remaining elements of s_t by using (9)–(11); once this is done we have actually identified the state.[7]

Identifying the wedges' marginal effects The last step in the methodology is to isolate the marginal effects of the wedges. For this purpose, we allow for a subset of the wedges to fluctuate (as they do in the data) while the remaining ones are kept constant. Starting from k_0^d, we take s_t^d, the decision rules, and the law of motion for capital to construct the realized sequences of output, labor, and investment when only the subset of wedges is operating. We can then compare these estimated values to observed ones, and assess the relative importance of the wedges over the

[7] Note that the four wedges account for all of the movements in output, labor, investment, and government consumption, in the following sense: if one feeds all the wedges into the decision rules in (13) and uses $g_t(s_t^d) = s_{gt}$ together with the law of motion for capital (5), the original data can be recovered.

economy.

4 Results

The graphical analysis of the BCA exercise is presented in figures 4 through 7. We split the sample in two periods: 1973:3-1994:4 (first data set) and 1995:1-2009:4 (second data set); in this way, we try to overcome possible biases induced by the break observed in the trend of TFP after 1994 (see Figure 1 and Table 1). The periods in these figures have been chosen according to our analysis of previous section: the transition period (Figures 4 and 5), and the recession of 2008 (Figures 6 and 7).

We have made direct measurements of the wedges and calculated various sets of volatilities and correlations between the wedges and output components. These are available from the authors upon request.

4.1 The transition recession, 1976:3-1985:4

During the recession that accompanied the beginning of democracy, the labor wedge seems to have a key role in the evolution of output and hours worked. Throughout this section, we refer to Figure 4. On the left hand side of this figure, we present the data for output per capita, hours worked and investment as percentage of output, plus the predictions of a model using *only one* of the four wedges. On the right hand side, we present the observed and the simulated series when one of the wedges is excluded. The aim is to measure the marginal contribution of the four wedges in accounting for the observed fluctuations in the data.

In terms of output per capita, the prediction of the model with a labor wedge follows the data although the predicted output tends to overshoot the fall observed in the data. By 1985, observed output per capita is nearly 9% below trend, yet the model with a labor wedge predicts almost 25% below trend. When feeding the model with an investment wedge, the prediction is output per capita staying in trend throughout the sample. The prediction of the model with a feasibility wedge sends output per capita in opposite direction to the data; this model points out to a 5% expansion in the eighties. Finally, the model with an efficiency wedge predicts output per capita staying in trend (with a small deviation in 1980) up until 1983, when the model predicts a sustained expansion which ends up at about 15% above trend by 1985.

By looking at the prediction of the model with all but one wedge, it is easy to confirm that the

labor wedge is the key element in the analysis. The model without a labor wedge predicts output per capita staying in trend up to late 1979, and a large expansion thereafter. The predictions of a model without an investment or a feasibility wedge follow the observed output per capita closely, and so does the model without an efficiency wedge (which, however, tends to overshoot the recession).

In terms of hours worked per capita, a model with a labor wedge can account for most of the action observed in the data. Models with an efficiency or an investment wedge predict a reduction in hours, yet the fall is not of the right magnitude. A model with a feasibility wedge would predict an increase in hours for all years in the sample.

Finally, in terms of investment as percentage of output, one cannot see a particular wedge playing a key role in the evolution of this ratio. When feeding the model with each of the wedges, the prediction in some periods overshoots and in other underpredicts the observed values. By looking at the predictions of the model without the feasibility wedge one could argue, however, that a model with labor, investment, and efficiency wedges does a fairly good job in capturing the evolution of the data.

Discussion Figure 4 confirms that the labor wedge has the biggest capacity in explaining the fluctuations in output per capita and hours worked per capita. When removed, the model loses an important part of prediction capacity, mainly after the Moncloa Pacts in October 1978. Among other things, the Pacts reformed basic labor institutions and set the basis for the modernization of the tax system. Both the investment wedge and the government wedge have had a limited role in accounting for the fluctuations of output and hours in this recession.

In line with Conesa and Kehoe (2005), the decline in hours worked during the first two decades of democracy could be associated to an increase in taxes and labor reforms after the Moncloa Pacts. Tax rates were increased and adapted to the forthcoming times. In Spain, tax revenues are mostly obtained from a progressive income tax[8] and a value-added tax.[9] Boscá, García, and Taguas (2008) provide annual estimates of the labor income tax τ_L, the capital income tax τ_K, and the consumption tax τ_C, for a set of OECD countries between 1960 and 2005, following the methodology proposed by Mendoza, Razin, and Tesar (1994). These series have been transformed

[8] The Income Tax was created on 1978 and reformed on 1991, 1998, and 2006.

[9] The VAT was created on 1985 and homogenized with that of the EEC countries, synthesizing a complex collection of indirect taxes. Reforms of this tax are given on 1992 and 1998.

to quarterly frequency using Denton's (1971) method. We calculate the following tax wedge

$$TW_t = 1 - \frac{1 - \tau_{Lt}}{1 + \tau_{Ct}} \tag{14}$$

i.e. the tax distortion that affects the intratemporal condition. Note that an increase in τ_L or τ_C makes the tax wedge increase. Figure 5 presents the tax wedge together with our estimation of the labor wedge (upper figure), and the percentage change in both wedges (lower figure) for the period 1976:3-1984:4. The tax wedge (14) increased until 1986 when Spain became a member of the EEC, and has remained relatively constant afterward. Compared to the evolution of hours worked plotted on Figure 3, the fall in average hours worked was parallel to an increase in the taxation affecting the intratemporal condition, consistent with a gradual substitution of consumption for leisure (leisure becomes cheaper relative to consumption; see Conesa and Kehoe 2005 and Prescott 2004). The lower plot in Figure 5 illustrates that a sensible fraction in the swings of the labor wedge can be accounted by the increase in taxation.

Tax reforms may not be the unique reason to account for the fall in hours worked and the output per capita contraction. The 1978 Constitution, together with the Moncloa Pacts, promoted the creation of the *Estatuto de los Trabajadores* as a benchmark for labor aspects affecting the wage mechanism and the labour supply, namely: a legal minimum wage (art. 27), weekly rest for at least one day and a half (art. 37.1), fourteen holidays during the year (art. 37.2), and thirty days of vacations per worked year (art. 38). Trade unions and the freedom of unionization were legally recognized on 1977, and strikes were legalized by *RD Ley 17/1977*. Several indicators (union coverage, collective bargaining centralization index, etc.) point out that the labor union market power can account for the evolution of the labor wedge after 1985 (see Nickell, 2006; regressions and more information about this is available from the authors upon request).

Interestingly, the expansion predicted by the efficiency wedge points out to the drastic industrial restructuring (known as *la reconversión industrial*) that took place after 1982, consisting in severe reforms of the management of key public industrial firms. During this episode, thousands of workers moved to other activities, mainly in the service sector; incidentally, the firms affected by the industrial restructuring were also severely hit by the oil price shocks of the seventies (e.g., metallurgy, shipyards, etc.). It seems reasonable to assume that the mobility of factors motivated by the restructuring implied efficiency gains that manifested via the efficiency wedge. Also, the privatization of public firms started during this period. All these factors together positively affected the levels of efficiency (see Nicoletti and Scarpetta, 2003).

It should be emphasized that during the four decades of dictatorship, the Spanish economy was heavily intervened and a variety of firms were state-owned, many of them managed by the *Instituto Nacional de Industria* (INI).[10] The government guaranteed a wide degree of market power for these firms, either in the form of monopoly, oligopoly, or monopsony. After 1981, the INI was dismantled in a gradual privatization process that ended in the second half of the nineties. In the sectors of oil refining, broadcasting, and telecommunications, liberalization preceded privatization.

4.2 The great recession, 2007.2-2009.4

The BCA methodology, presented on Figure 6, shows that the labor, investment and efficiency wedges can account for the observed fluctuations in output and hours. In terms of output per capita, the prediction of a model with these three wedges can capture the direction of the data; however, their match is far from perfect, as the models would imply a deeper recession. A model with a feasibility wedge predicts a 10% boom above trend rather than a recession. This same pattern is repeated when analyzing hours worked per capita. In terms of investment as percentage of output, a model with an investment and efficiency wedges predicts a drastic fall. The labor and feasibility wedges mislead the direction of the investment rate.

It is worth noting that a model without a feasibility wedge predicts a drastic reduction in the evolution of the three variables under consideration. This, of course, follows directly from the way that the feasibility wedge is measured, as the sum of government expenditures and net exports, which tends to be countercyclical. As a robustness check, we also compute the wedges according to Lama's (2011) methodology who extends the BCA for an open economy framework. The household's budget constraint is rewritten as

$$c_t(s^t)+x_t(s^t)+b_{t+1} = (1-\omega_{lt}(s^t))W_t(s^t)l_t(s^t)+(1-\omega_{kt}(s^t))R_t(s^t)k_t(s^{t-1})+(1+\omega_{bt}(s^t))(1+r_t^*)b_t+T_t(s^t), \tag{15}$$

where b_t is an international bond, r_t^* is the return on holding this asset, and ω_{kt}, ω_{bt} denote the capital and bond wedges, respectively. Note that an international financial friction can manifest through the bond wedge and will have a direct impact on the trade balance,

$$TB_t = b_{t+1} - \left(1+\omega_{bt}(s^t)\right)\left(1+r_t^*\right)b_t. \tag{16}$$

[10] Some examples are SEAT and ENASA (automobile), Iberia (airlines), AESA and Bazán (civil and military shipyards), ENSIDESA (metallurgy), Santa Bárbara (weapons and explosives), and HUNOSA (coal mining). Other public non-INI firms were RTVE (broadcasting), CAMPSA (oil refining), RENFE (railroad transport), Tabacalera (tobacco) and Telefónica (telecommunications).

The investment wedge should also be reinterpreted with respect to its standard version in (4). In this new vein, the (capital) wedge in (15) collects any friction that may affect the return from holding the physical asset k_t.

The results are shown on Figure 7. The labor wedge has an overwhelmingly importance in accounting for the downturn in output per capita, hours per capita and the investment rate. The bond wedge has a negligible impact and mislead the fluctuations in these three variables. Compared with the standard BCA analysis in Figure 6, this open economy BCA framework provides no role to the efficiency wedge.

Discussion A wide consensus among economists associates the 2008 recession to the outbreak of the housing bubble. From the start of the Euro in 1999, investment had been increasing and a considerable fraction of it had been devoted to this housing boom (a durable, albeit non productive, asset). This made the economy to incur serious foreign imbalances. The current account deficit was prolonged and sustained across the whole decade, enhanced by an easy credit access and low real interest rates: foreign accounts peaked a deficit on December 2007 when the current account and the trade banlance reached -10.4% and -7.4%, respectively, over GDP. By the end of 2009 these figures were downsized to -4.0% and -2.3%.

The banking sector greatly benefited from that situation. However, the end of the bubble dramatically cancelled that flow of mortgages and loans to families and firms: while the housing price had been increasing around 20% per year, both the banking system and the public had incentives to persist in this spiral of credits. The situation turned out dramatic when the unemployment rate quickly reached 19% on December 2009. To the extent the banks' balance sheets are polluted by these assets related to the real estate sector, the flow of credit will be inexistent. Thus, a sound reform of the banking system is a necessary non-sufficient task to quit this enduring recession.

In an attempt to counteract this situation, in the very first moment, the Spanish Government responded using fiscal stimuli, while structural reforms or supply policies were postponed. The loss of monetary sovereignty has made fiscal policy the government's unique way to counter the recession, given that devaluations are no longer possible. The public deficit exceeded 11% of GDP at the end of 2009. Note that the prediction of a model with a feasibility wedge only (Figure 6, closed economy BCA) completely misses output, hours and investment.

Both in Figures 6 and 7, the prediction of a model without a labor wedge has output and hours per capita staying (almost) at their trend levels, and something similar could be said about the

efficiency wedge in Figure 6 (closed economy BCA), but not in Figure 7 (open economy BCA). In this sense, our results point out to the fact that efficiency is not a cyclical issue in Spain, but rather a problem concerning the trend or the permanent component of the series (see Table 1 and Jimeno, Moral, and Saiz, 2007).

The open economy BCA (Figure 7) points out to the fact that the bond wedge plays no role in producing the downturns in these variables. In this sense, although the contagion might come from abroad (say the credit crunch, the current account deficits and the end of the bubble), the foreign sector cannot be blamed for the increase in unemployment, as it should be regarded as the propagation through rather domestic or idiosyncratic items: models that attempt to explain the current recession should focus on the labor wedge, no matter whether the model is thought for a small open economy or not. The frictions that might originate the labor wedge can be of different nature and should be identified: taxation, labor market institutions, or the competitiveness in the goods markets.

5 Conclusions

In this paper we have provided a characterization of two recessions occurred in Spain since the inception of Democracy, using the methodology proposed by Chari, Kehoe, and McGrattan (2007) and the open economy version proposed in Lama (2011). We have aimed at mapping institutional and political changes to the wedge accounting for different cycles.

We conclude that different cycles have different causes. However, the labor wedge has been the key element behind these fluctuations. We conjecture that the design of taxes and labor market institutions are likely behind this wedge movements. Therefore, in the logic of the BCA methodology, any model that tries to understand the causes of the recessions occurred in the last three decades should focus on this wedge. The feasibility wedge—labeled as government wedge in the original work of Chari, Kehoe, and McGrattan (2007)—has a minimal impact over output and hours per capita, as well as investment.

The bond wedge in the extension proposed by Lama (2011), as a source of foreign distortions, hitting the trade balance, has no role in accounting for the current recession. Hence, the actual downturn in output and the huge increase in the Spanish unemployment rate should be related to the factors behind the labor wedge: taxation, labor market regidities and the overall competitiveness of the economy.

Finally, the worrying evolution of efficiency cannot be only regarded as a cyclical problem but as a permanent problem.

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A Data appendix

From the Instituto Nacional de Estadística (INE),[11] we retrieve data on output, investment, consumption, government expenditures, exports, and imports. The national accounting methodology was modified in 1998; as a result, there are two data series: 1970.1-1998.4 and 1995.1 to 2009:4. For the BCA analysis of recession 1976:3-1985:4 we use the first data set, and for the recession 2008:2-2009:4 we use the second one.

The investment series from INE includes both residential and non-residential capital, as well as firms' inventories. Using an average annual depreciation rate of 4.08%, the aggregate stock of capital is calculated using the method of perpetual inventories. From the EU KLEMS database,[12] we take the capital stock relative to GVA in 1970 as 3.27 (13.07 in quarterly terms).

Labor series are obtained from the Encuesta de Población Activa (EPA, or Current Population Survey). We use series on civil population, labor force, workers, unemployed workers and average hours worked per worker. Changes in the EPA methodology are controlled for, so that all series are homogenous. When necessary, series have been seasonally adjusted using Banco de España's software package TRAMO-SEATS.

[11] See `http://www.ine.es/`

[12] See `http://www.euklems.net/`.

Figure 1: Output per capita, productivity and TFP in Spain 1976.3-2009.4 (1976.3 == 1)

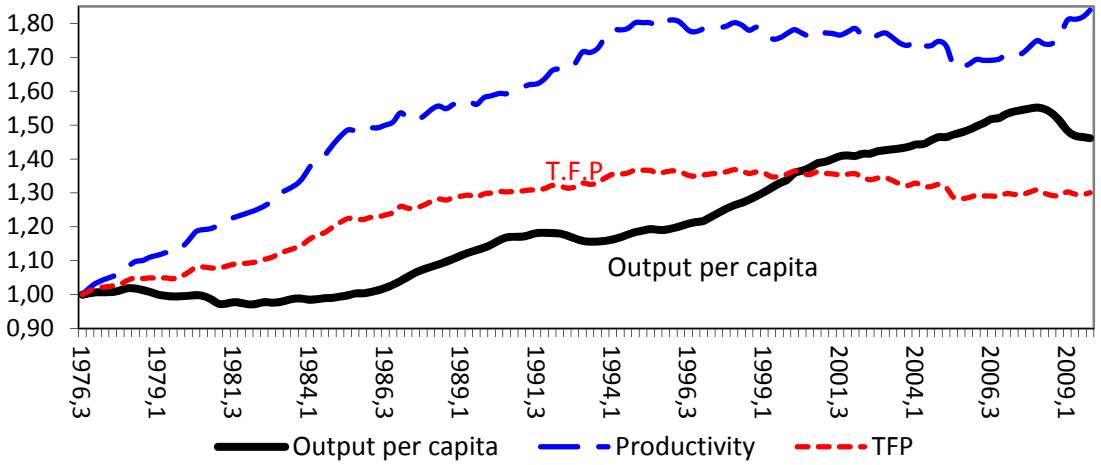


Figure 2: Fluctuations in Spain, 1976.3-2009.4

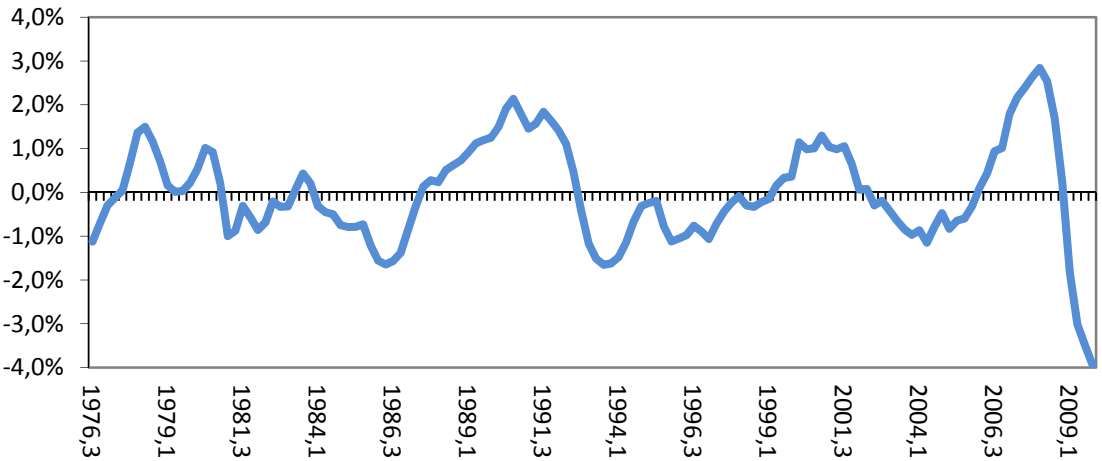


Figure 3: Hours in Spain 1976.3-2009.4 (1976.3 == 1)

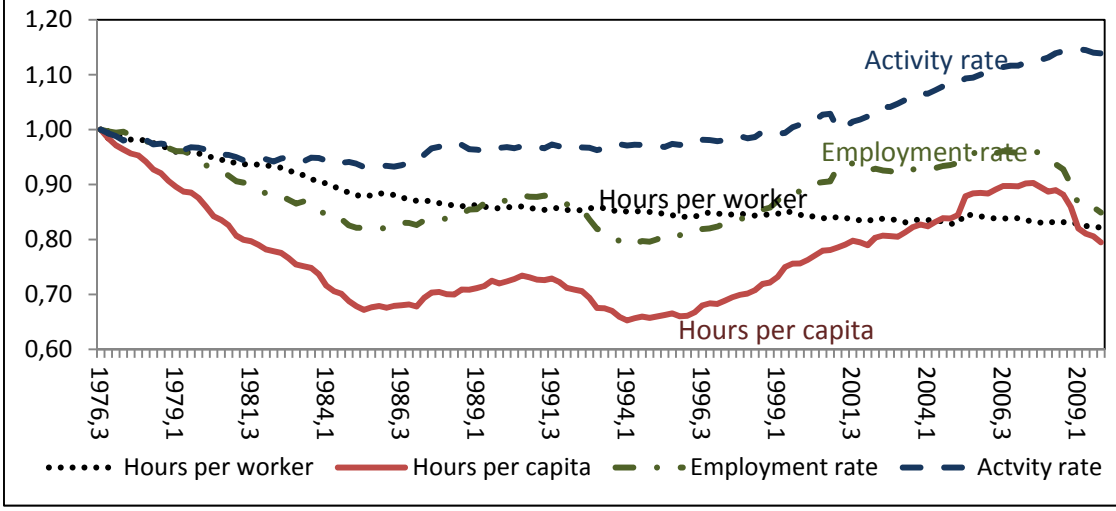
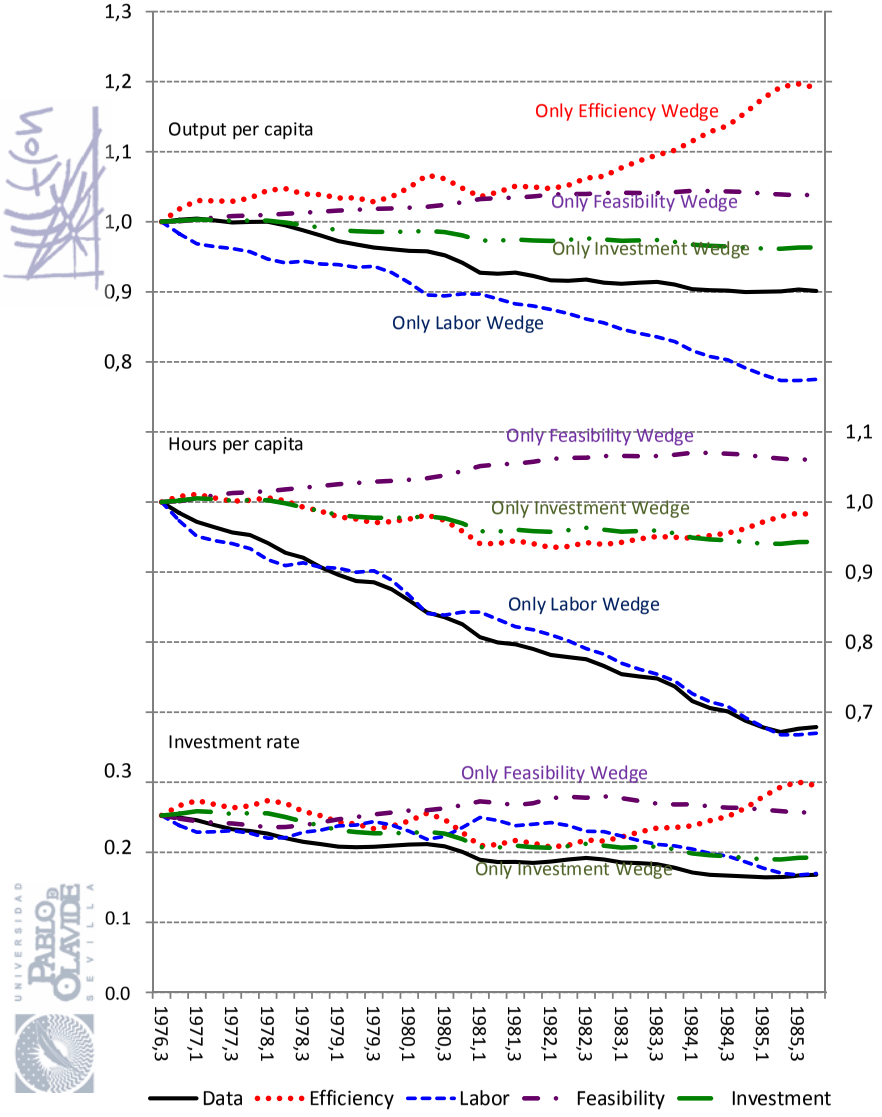


Figure 4: Data and model with (left graph) and without (right graph) one wedge 1976:3-1985:4



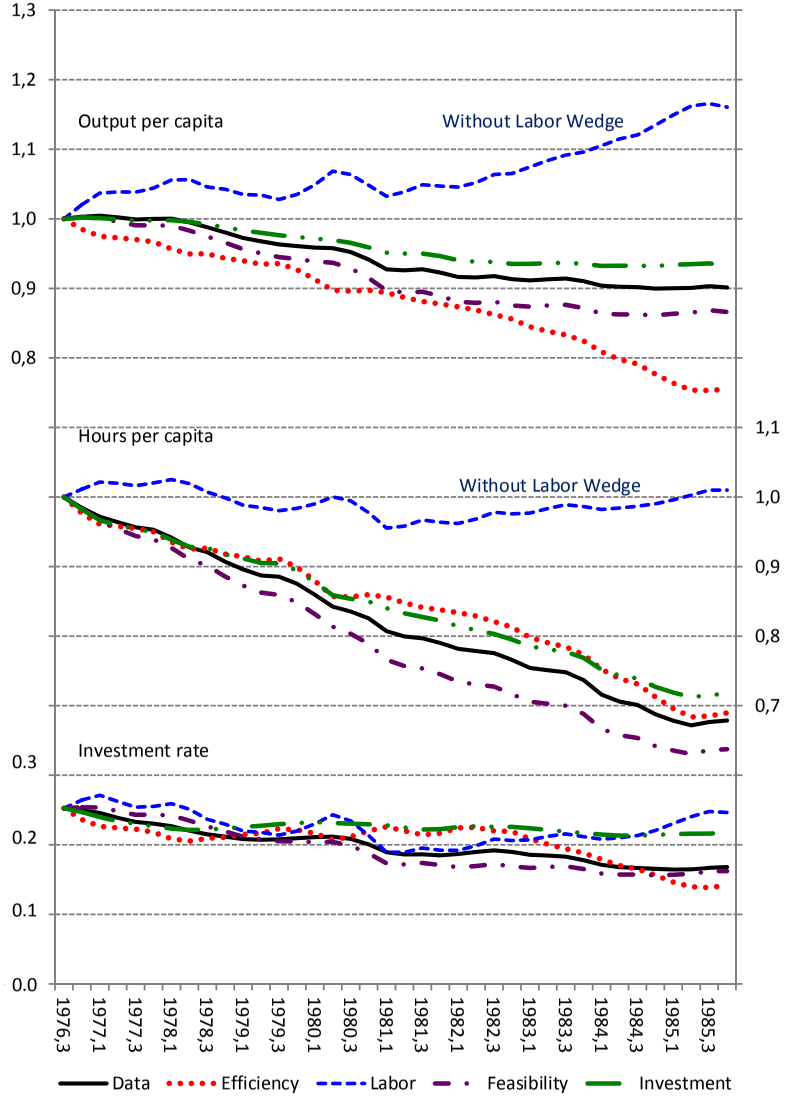
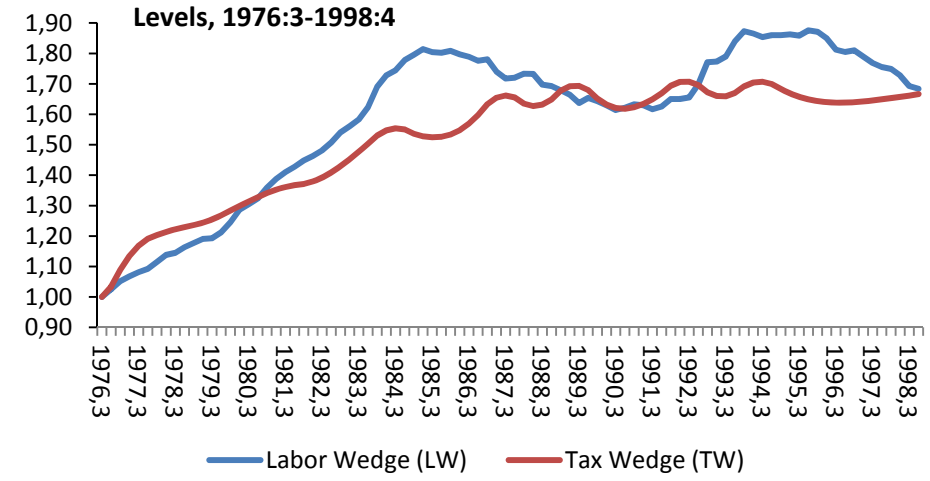


Figure 5: Labor Wedge versus Tax Wedge



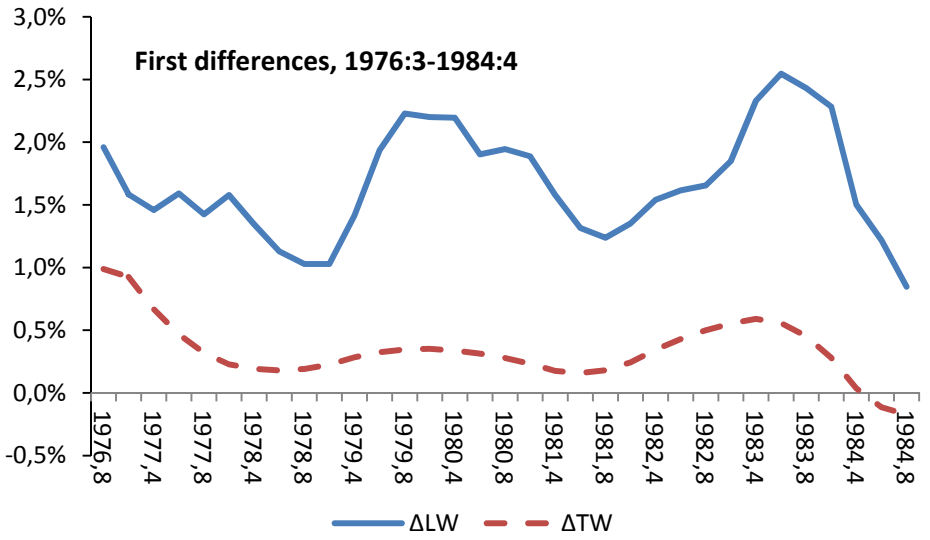


Figure 6: Data and model with only one wedge 2007:4-2009:4. Closed Economy.

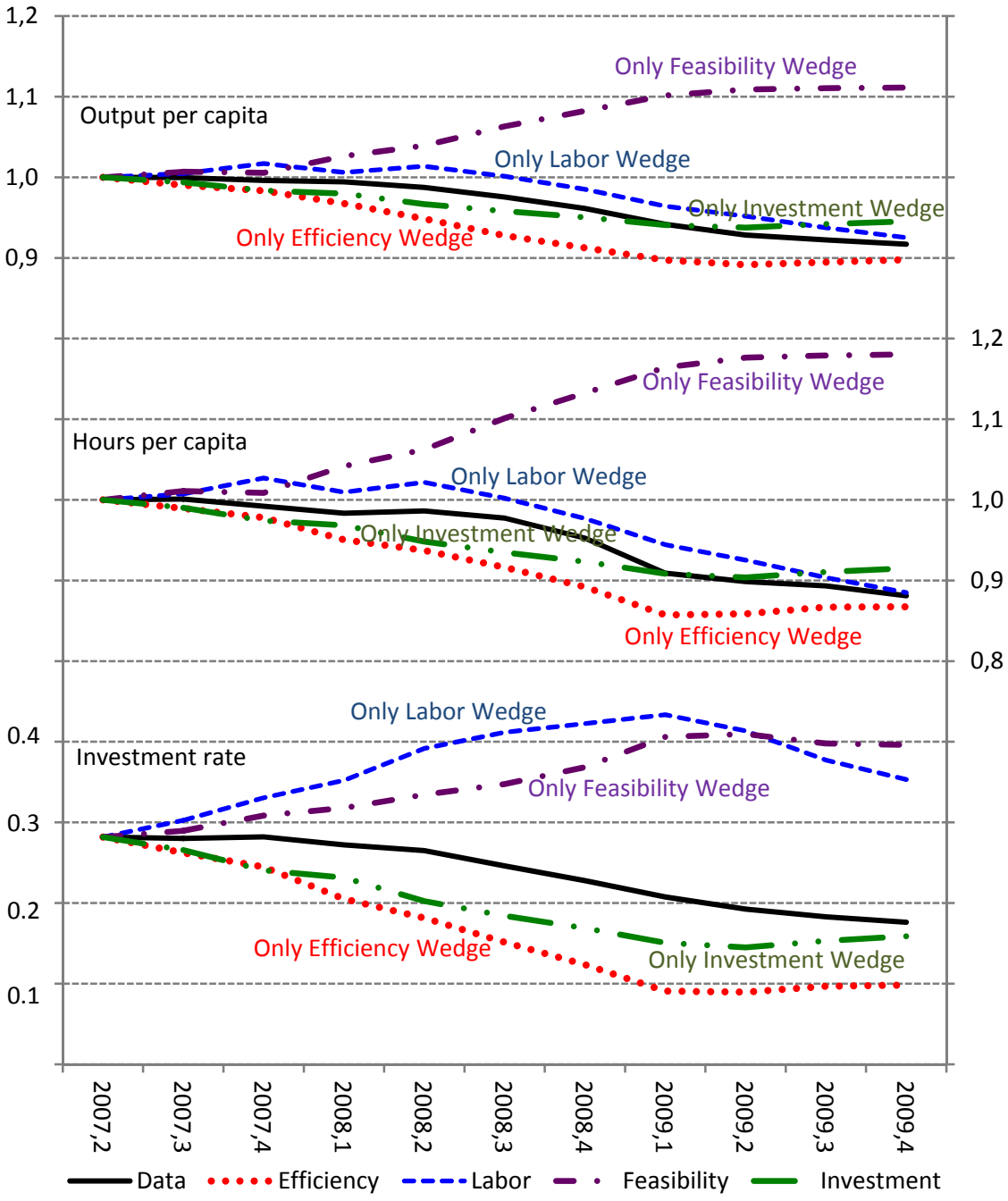


Figure 7: Data and model with only one wedge 2007:4-2009:4. Open Economy.