Housing Purchase versus Rental in Spain*

Preliminary and Incomplete

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March 26, 2010

Abstract

There are important idiosyncrasies of the Spanish housing market different to other European economies. One salient difference is the low rental share in Spain. Recently, some measures to enhance rentals in Spain have been announced. In this paper, we build a DSGE model with collateral constraints and both housing purchases and rental to explore how some of these measures could potentially affect housing markets in Spain. In particular, we find that removing the existing 15% subsidy to housing purchases downsizes the housing sector and increases the rental share. It also decreases housing prices, although the effect is milder if the shock is anticipated. The second experiment that we perform is improving the rental market efficiency so that the rental share increases to 20%. We find that changes in the economy are along the same lines as the previous measure analyzed.

Keywords: Rental Market, Fiscal Incentives to Housing Purchases

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The authors want to thank seminar participants at the Bank of Spain for very useful comments. Special thanks to Javier Andrés, Luis Ángel Maza and Juan Mora. The views displayed in this paper are those of the authors and not those of the Bank of Spain or the Eurosystem.

1 Introduction

Recent economic developments have taught us that housing is a key ingredient to understand the scope of the current crisis and to shape the recovery. This statement is true all throughout Europe (&beyond) but especially in Spain where the housing market experimented a very strong boom as compared to many of its EMU partners.[1]

The problem has to be viewed from a global perspective, considering both demand and supply aspects of housing markets, prices and quantities, interactions between financial and real variables, and interactions between rental and ownership markets.[2] In order to capture all these aspects, it is important to follow the appropriate DSGE modelling strategy.

There are important idiosyncrasies of the Spanish housing market which are different to its EMU partners. It is relevant to capture those differences and investigate the effects of possible policy actions on them. An important difference between housing markets in Spain versus the big countries of the EMU, which has already been explored, is the fact that in Spain the vast majority of borrowers have variable-rate mortgages. This makes them worse-off in terms of welfare because they have to bear the interest-rate variability risk.[3] However, one salient feature in the Spanish housing market, which has not been analyzed in a general equilibrium context, is its strikingly low rental share.

Differences in rental shares across countries are very remarkable. For instance, in 2007 the rental share was 11% in Spain versus 29% in the EU, or 60% in Germany for 2009. What leads to those huge differences in rental markets is open to debate. One could think that they are due to exogenous cultural or preference factors, that is, Spaniards simply like to own houses whereas Germans prefer to rent them. However, a more plausible explanation could be that the different tax systems across countries favor either the rental or the owner-occupied market. According to Rodríguez (2009), the historical housing policy in Spain could be responsible for the lack of rentals in Spain and could have contributed to create a "property culture". Tax incentives in Spain seem to have favored housing purchases whereas in countries such as Germany, the incentives were aiming at rental markets. In the last years there have been some measures to enhance the rental market in Spain, in particular fiscal deductions and incentives. Among these measures, it has been announced the removal of the 15% income tax deduction for higher incomes to housing purchases after January 1st., 2011. Furthermore, there will be a slight improvement of fiscal

[1] See Marqués et al. (2010)
[2] See Andrés and Arce (2008) for an example of a DSGE model with a rental market.
[3] See Rubio (2009)

treatment of rental income from 2011.

There can also be institutional factors that affect the rental market share. For instance, the capacity of the system to enforce rental contracts can also be a crucial issue.[4] Some steps in order to improve the protection of landlords in Spain have also been taken. Specifically, in November 2009, a new law was implemented to facilitate the expulsion of tenants if the house recovery is needed ("Ley 19/2009 de Medidas de Fomento y agilización procesal del alquiler"). All these measures are part of a project in which the Spanish government aims at increasing the rental share to 20% in 2020 ("Proyecto de ley de economía sostenible").

In this paper, we build a DSGE model for Spain and the EMU with housing and financial restrictions.[5] It is a two country model with heterogeneous households, namely borrowers and savers. There are two sectors in the economy: consumption and housing. Consumption goods are tradable while housing is a non-tradable good. The novelty of this model with respect to others of a similar kind is that we introduce a rental market and analyze the effects of changes in taxation and rental market efficiency across countries. So far, we focus on rental markets in Spain, but the model is flexible enough to consider other countries for comparison.

Our aim is to evaluate the effects on the Spanish housing markets of some of the measures proposed by the government to enhance the rental market. In particular, we check the effects of the proposed removal of the subsidy to housing purchases in Spain and find it downsizes the housing sector and increases the rental share. It also decreases housing prices although the effect is milder if the shock is anticipated. We use the efficiency parameter of producing rental services as a proxy for the efficiency of institutions to legally enforce rental contracts. We then check the effects of a change the efficiency of rental market to generate an increase in the rental share to 20%. Our results show that changes in the economy are along the same lines as the previous measure analyzed.

The paper is organized as follows: Section II presents the model, section III displays the main results of simulations and section IV concludes.

[4] See Casas-Arce and Saiz (2008) and Mora (2009)

[5] See Rubio (2009) and Aspachs and Rabanal (2008) for models that take into account differences in housing markets across EMU countries.

2 Model Setup

We consider two countries, Country A and Country B. There are savers and borrowers in each country which differ in their discount factors. Savers consume goods produced domestically and abroad, derive utility from housing, and work. Savers can trade financial assets both domestically and internationally. Countries are in a monetary union in which the euro is the common currency, therefore assets are denominated in euros. Borrowers are more impatient than savers and need collateral to obtain loans. There are two sectors: the housing and the consumption goods sector. For simplicity, housing is a non-tradable good. Consumption goods prices are sticky. Houses can be bought or rented. There are fiscal incentives to housing purchases. Monetary policy is conducted by a single central bank and fiscal policy is implemented at the country level.

2.1 Savers

Savers in Country A choose consumption, housing and labor in order to maximize

$$U_0^s = E_0 \sum_{t=0}^{\infty} (\beta^s)^t \left(\log C_t^s + \vartheta \log H_t^s - \frac{(L_t^s)^{1+\eta}}{1+\eta} \right)$$

where β^s is the savers discount factor, ϑ is the weight of housing in the utility function and H_t^s are housing services derived from housing purchases. L_t^s represents labor and it is a composite between labor devoted to the consumption sector and the housing sector,

$$L_t^s = \left[\omega_l^{1/\varepsilon_l} \left(L_{ct}^s \right)^{(1+\varepsilon_l)/\varepsilon_l} + (1-\omega_l)^{1/\varepsilon_l} \left(L_{ht}^s \right)^{(1+\varepsilon_l)/\varepsilon_l} \right]^{\varepsilon_l/(1+\varepsilon_l)}. \tag{1}$$

C_t^s is a bundle of domestically and foreign produced goods, so that $C_t^s = \left(C_{At}^s\right)^{n+\xi} \left(C_{Bt}^s\right)^{1-n-\xi}$, where n is the size of Country A and $\xi \geq 0$ measures the degree of home bias in consumption. Subject to the nominal budget constraint,

$$P_{At} C_{At}^s + P_{Bt} C_{Bt}^s + Q_t^h \left[\left((1-\tau_A) \left(H_t^s - (1-\delta_h) H_{t-1}^s \right) \right) + \left(H_t^z - (1-\delta_h) H_{t-1}^z \right) \right] + B_t + D_t =$$
$$W_{ct} L_{ct}^s + W_{ht} L_{ht}^s + Q_t^z Z_t + R_{At-1} B_{t-1} + R_{t-1} \Gamma \left(\frac{-D_t}{P_{At} Y_t} \right) D_{t-1} + P_{At} F_t - P_{At} T_t.$$

P_{At} is the price of good produced in Country A. P_{Bt} is the price of good produced in Country B. Q_t^h is the price of houses produced and traded in Country A. τ_A is a tax on the houses that are purchased in

Country A. B_t and D_t are domestic and foreign bonds held by savers, respectively. $W_{ct}L^s_{ct}$ and $W_{ht}L^s_{ht}$ are labor income obtained in the goods and the housing sector, respectively. R_{At} is the nominal interest rate on domestic bonds. R_t is the nominal ECB rate. In order to ensure stationarity of equilibrium, we follow Schmitt-Grohe & Uribe (2001) and assume that domestic agents pay a risk premium Γ which is strictly increasing in the country's debt to GDP ratio, $(-D_t)/(P_{At}Y_t)$. We assume that the risk-premium takes the form $\Gamma(x) = e^{\psi x}$, with $\psi > 0$. F_t are firms profits rebated to savers every period. T_t are government transfers. Savers also accumulate houses, H^z_t, that are used to produce rental services Z_t, according to the production function $Z_t = A_Z H^z_{t-1}$. A_Z measures the efficiency of the rental market and will serve as a proxy of the efficiency of institution to enforce rental contracts. Rental services are sold competitively to borrowers at a unit nominal price of Q^z_t.We can rewrite the budget constraint in terms of the price in Country A:

$$C^s_{At} + p^B_t C^s_{Bt} + q^h_t\left[(1-\tau_A)\left(H^s_t - (1-\delta_h)H^s_{t-1}\right) + \left(H^z_t - (1-\delta_h)H^z_{t-1}\right)\right] + b^s_t + d_t =$$
$$w_{ct}L^s_{ct} + w_{ht}L^s_{ht} + q^z_t Z_t + \frac{R_{At-1}b_{t-1}}{\Pi_{At}} + \frac{R_{t-1}e^{\psi(-d_t)/Y_t}d_{t-1}}{\Pi_{At}} + F_t - T_t,$$

where $\Pi_{At} = P_{At}/P_{At-1}$ denotes domestic inflation and $p^B_t \equiv P_{Bt}/P_{At}$ is the price of foreign goods in terms of home goods (that is, the terms of trade). The first order conditions of the maximization problem are the following,

$$\frac{C^s_{At}}{C^s_{Bt}} = \left(\frac{n+\xi}{1-n-\xi}\right)p^B_t, \tag{2}$$

$$\frac{\vartheta}{H^s_t} = (1-\tau_A)\left(\frac{q^h_t}{C^s_{At}/(n+\xi)} - \beta^s E_t \frac{q^h_{t+1}(1-\delta_h)}{C^s_{At+1}/(n+\xi)}\right), \tag{3}$$

$$\frac{1}{C^s_{At}} = \beta^s E_t \frac{1}{C^s_{At+1}}\frac{R_{At}}{\Pi_{At+1}}, \tag{4}$$

$$R_{At} = R_t e^{\psi(-d_t)/Y_t}, \tag{5}$$

$$\frac{w_{ct}}{C^s_{At}/(n+\xi)} = (L^s_t)^{\eta}\,\omega_l^{1/\varepsilon_l}\left(\frac{L^s_{ct}}{L^s_t}\right)^{1/\varepsilon_l}, \tag{6}$$

$$\frac{w_{ht}}{C^s_{At}/(n+\xi)} = (L^s_t)^{\eta}\,(1-\omega_l)^{1/\varepsilon_l}\left(\frac{L^s_{ht}}{L^s_t}\right)^{1/\varepsilon_l}, \tag{7}$$

$$\frac{q^h_t}{C^s_{At}} = \beta^s E_t\left[\frac{(1-\delta_h)q^h_{t+1} + q^z_{t+1}A_Z}{C^s_{At+1}}\right]. \tag{8}$$

Equation (2) equates relative prices to the marginal rate of substitution between the good produced in Country A and in Country B. Equation (3) is the first order condition for owner-occupied housing. Equation (4) is the Euler Equation for domestic bonds, and (5) follows from no arbitrage. Equations (6) and (7) are the first order conditions for labor supply in the consumption and housing sector, respectively. Equation (8) is the first order condition for housing purchases for production of rental services. Everything is similar in Country B.

2.2 Borrowers

Borrowers have a discount factor $\beta^b < \beta^s$ and maximize:

$$U_0^b = E_0 \sum_{t=0}^{\infty} \left(\beta^b\right)^t \left(\log C_t^b + \vartheta \log \tilde{H}_t^b - \frac{\left(L_t^b\right)^{1+\eta}}{1+\eta} \right)$$

where

$$L_t^b = \left[\omega_l^{1/\varepsilon_l} \left(L_{ct}^b\right)^{(1+\varepsilon_l)/\varepsilon_l} + (1-\omega_l)^{1/\varepsilon_l} \left(L_{ht}^b\right)^{(1+\varepsilon_l)/\varepsilon_l} \right]^{\varepsilon_l/(1+\varepsilon_l)}, \tag{9}$$

$$\tilde{H}_t^b = \left[\omega_h^{1/\varepsilon_h} \left(H_t^b\right)^{(\varepsilon_h-1)/\varepsilon_h} + (1-\omega_h)^{1/\varepsilon_h} \left(Z_t\right)^{(\varepsilon_h-1)/\varepsilon_h} \right]^{\varepsilon_h/(\varepsilon_h-1)}, \tag{10}$$

that is, borrowers derive utility both from living in an owned and in a rented house and thus consume an index of both. Subject to the budget constraint written in terms of good A price,

$$C_{At}^b + p_t^B C_{Bt}^b + q_t^h \left(1-\tau_A\right) \left[H_t^b - \left(1-\delta_h\right) H_{t-1}^b \right] + q_t^z Z_t + \frac{R_{At-1} b_{t-1}}{\Pi_{At}} = w_{ct} L_{ct}^b + w_{ht} L_{ht}^b + b_t, \tag{11}$$

and to a collateral constraint,

$$b_t \leq \frac{m}{R_{At}} E_t \Pi_{At+1} q_{t+1}^h H_t^b. \tag{12}$$

The first order conditions of this problem are the following,

$$\frac{C_{At}^b}{C_{Bt}^b} = \left(\frac{n+\xi}{1-n-\xi} \right) p_t^B, \tag{13}$$

$$\frac{n+\xi}{C_{At}^b} = \beta^b E_t \frac{n+\xi}{C_{At+1}^b} \frac{R_{At}}{\Pi_{At+1}} + \lambda_t \tag{14}$$

$$\frac{w_{ct}}{C_{At}^b / \left(n+\xi\right)} = \left(L_t^b\right)^{\eta} \left(\frac{\omega_l L_{ct}^b}{L_t^b} \right)^{1/\varepsilon_l}, \tag{15}$$

$$\frac{w_{ht}}{C_{At}^b/\left(n+\xi\right)} = \left(L_t^b\right)^{\eta}\left(\frac{\left(1-\omega_l\right)L_{ht}^b}{L_t^b}\right)^{1/\varepsilon_l}, \tag{16}$$

$$\frac{\vartheta}{\tilde{H}_t^b}\left(\frac{\omega_h\tilde{H}_t^b}{H_t^b}\right)^{1/\varepsilon_h} = \left(1-\tau_A\right)\left(\frac{q_t^h}{C_{At}^b/\left(n+\xi\right)} - \beta^b E_t\frac{q_{t+1}^h\left(1-\delta_h\right)}{C_{At+1}^b/\left(n+\xi\right)}\right) - \lambda_t m E_t q_{t+1}^h\frac{\Pi_{At+1}}{R_{At}} \tag{17}$$

$$\frac{\vartheta}{\tilde{H}_t^b}\left(\frac{\left(1-\omega_h\right)\tilde{H}_t^b}{Z_t}\right)^{1/\varepsilon_h} = \frac{q_t^z}{C_{At}^b/\left(n+\xi\right)}, \tag{18}$$

where λ_t is the Lagrange multiplier on the collateral constraint. Borrowers behave symmetrically in Country B.

2.3 Firms

The intermediate goods market is perfectly competitive. Intermediate goods are produced according to the following technology,

$$Y_t = A_{ct}\left(L_{ct}^s + L_{ct}^b\right), \tag{19}$$

where A_{ct} represents productivity in the consumption sector, L_{ct}^s and L_{ct}^b are the savers and borrowers labor in the consumption sector. New homes are produced using the following technology,

$$IH_t = A_{ht}\left(L_{ht}^s + L_{ht}^b\right), \tag{20}$$

where A_{ht} represents productivity in the housing sector, L_{ht}^s and L_{ht}^b are the savers and borrowers labor in the housing sector, respectively. Free entry in both sectors implies the following zero profit conditions,where p_t^I is the real price of the intermediate good (real marginal cost for final goods producers). The first order conditions for this problem are as follows,

$$w_{ct} = p_t^I A_{ct} \tag{21}$$

$$w_{ht} = q_t^h A_{ht} \tag{22}$$

where p_t^I is the real price of the intermediate good (real marginal cost for final goods producers). Everything is analogous in Country B.

2.4 Final goods producers

Aggregate output Y_t is a composite of different varieties produced by monopolistically competitive retail firms. Prices are sticky in the retail sector. As in the standard Calvo setting the retailer pricing decision implies in each country the following Phillips Curve,

$$\log \Pi_{At} = \beta^s \log \Pi_{At+1} + \frac{(1-\theta)(1-\theta\beta^s)}{\theta} \log\left(p_t^I \frac{\varepsilon_p}{\varepsilon_p - 1}\right) + \log u_t \tag{23}$$

where θ is the probability of firms not changing prices, ε_p is the elasticity of substitution across final goods, $\varepsilon_p/(\varepsilon_p - 1)$ is the steady-state markup and u_t is a cost-push shock. A similar equation holds for Country B. Notice that terms of trade are determined by

$$p_t^B = \frac{\Pi_{Bt}}{\Pi_{At}} p_{t-1}^B.$$

2.5 Market Clearing

Housing market clearing implies

$$IH_t = H_t^s - (1-\delta_h) H_{t-1}^s + H_t^z - (1-\delta_h) H_{t-1}^z + H_t^b - (1-\delta_h) H_{t-1}^b, \tag{24}$$

and similarly for Country B. Market clearing for good A implies

$$n\left(C_{At}^s + C_{At}^b\right) + (1-n)\left(C_{At}^{s*} + C_{At}^{b*}\right) = nY_t, \tag{25}$$

where variables with a star denote decisions made by agents in Country B. Similarly, for good B we have

$$n\left(C_{Bt}^s + C_{Bt}^b\right) + (1-n)\left(C_{Bt}^{s*} + C_{Bt}^{b*}\right) = (1-n) Y_t^*. \tag{26}$$

The world bond market will also clear,

$$nd_t + (1-n) p_t^B d_t^* = 0, \tag{27}$$

where country A's net foreign asset position (per capita) follows

$$d_t = \frac{R_{t-1} e^{\psi(-d_{t-1})/Y_{t-1}}}{\Pi_{At}} d_{t-1} + Y_t - C^s_{At} - C^b_{At} - \frac{P_{Bt}}{P_{At}} \left(C^s_{Bt} + C^b_{Bt} \right). \tag{28}$$

2.6 Monetary Policy

There is a central bank which sets a common interest rate according to a Taylor rule with interest rate smoothing:

$$R_t = (1/\beta)^{1-\phi_R} R^{\phi_R}_{t-1} \left(\Pi^n_{At} \Pi^{1-n}_{Bt} \right)^{(1+\phi_\Pi)(1-\phi_R)} e_{R,t} \tag{29}$$

where $e_{R,t}$ is an iid shock.[6]

3 Simulations

3.1 Parameter Values

In order to calibrate the model, we have tried to capture some steady-state ratios, focusing especially on Spanish ratios, which is the country of interest for this exercise. Since we would like to isolate the effects of different institutions and tax system, so far we are not that concerned about differences with the EMU in other parameter values. We are however aware that for other kind of exercises it would be worth it to have a more realistic calibration of the EMU area. Table 1 presents a summary of the ratios we have tried to match for our calibration:

[6] The government in Country A taxes (subsidizes) housing purchases and rebates them back to savers, so that

$$T_t = Q^h_t \tau_A \left[H^s_t - (1-\delta_h) H^s_{t-1} + H^b_t - (1-\delta_h) H^b_{t-1} \right],$$

and similarly in Country B.

Table 1: Steady State Ratios

	Spain		Rest of EMU	
	Data (97-08)	Model	Data (97-08)	Model
Rental Share	0.077	0.105	0.265	0.157
Share of housing w/ mortg	0.305	0.330	NaN	0.269
Rental over housing price	0.012	0.012	NaN	0.012
Residential inv. over GDP	0.073	0.076	0.059	0.064
Weight of constr. in labor	0.138	0.138	0.080	0.128
Cons.in A over total	0.663	0.663	0.073	0.073

Matching these ratios we can recover the preference for housing services, the relative disutility of labor in the consumption sector, the preference for home ownership versus rent and the efficiency in production of rental housing services for the Spanish economy, which is the focus of our analysis in this exercise. We have also been able to recover the home bias in consumption in both countries. Table 2 presents the values of these calibrated parameters.

Table 2: Calibrated Parameters

ϑ	0.1416	Preference for housing services
ω_l	0.2067	Relative disutility of labor in consumption sector
ω_h	0.7793	Preference for home ownership versus rent
A_Z	1.6210	Efficiency in production of rental housing services
ξ	0.5629	Home bias in consumption A
ξ^*	0.0272	Home bias in consumption B

For the rest of the parameters we have used standard values in the literature. Table 3 presents the baseline parameter values we use for our simulations:

Table 3: Parameter Values		
β^s/β^b	0.99/0.97	Discount factor savers and borrowers
ε_l	1	Elasticity of substitution between labor types
ε_h	2	Elasticity of subst btw home ownership and rent
η	0.01	Inverse elasticity of labor supply
ε_p	6	Elasticity of substitution final goods
A_c/A_h	1/1	Efficiency goods and constr sectors, respectively
δ_h	0.01	Depreciation rate of the housing stock
m	0.85	Loan-to-value ratios
θ	0.75	Calvo parameter
τ_A/τ_B	0.15/0	Subsidy rate housing purchases for owner occupation A/B
ϕ_R	0.8	Coefficient on lagged nominal interest rate in Taylor rule
ϕ_Π	1.5	Coefficient on area-wide inflation in the Taylor rule
n	0.1	Size of country A
ψ	0.001	Elasticity of international risk premium

For savers, we use a discount factor that corresponds to an annual interest rate of 4%. For borrowers, we use a slightly lower discount factor, in line with the literature on DSGE models with housing and financial frictions. For the elasticity of substitution between labor types and between home ownership and rent we use 1 and 2, respectively. The inverse elasticity of labor supply follows Iacoviello (2005).[7] The value for the elasticity of final goods implies a markup of 1.2 in the steady state. The housing purchase subsidy in Spain is set to 0.15, consistent with current 15% income tax deduction for housing purchases. The probability of not changing prices, θ, is set to 0.75, implying that prices change every four quarters on average. For the Taylor Rule parameters we use 0.8 for the degree of interest-rate smoothing and 1.5 for the inflation parameter, consistent with the original parameters proposed by Taylor in 1993. The size of country A (Spain) is set to 0.1, in line with its relative weight in the EMU. The elasticity of the international risk premium is set to a very small number, as in Schmitt-Grohe & Uribe (2001).

[7] This value implies a virtually flat labor supply curve, higher than microeconomic estimates but rationalizing the weak observed response of real wages to macroeconomic disturbances.

3.2 Remove Subsidy to Housing Purchases

The first exercise we perform is evaluating the possible effects of removing a subsidy to housing purchases in Spain. As said in the introduction, the Spanish government has announced the removal of the 15% income tax deduction for higher incomes to housing purchases for houses bought after January 1st., 2011. In order to check the impact of this measure, we simulate the model for both $\tau_A = 0.15$ and $\tau_A = 0$ and compare the difference in the steady states of the model under both scenarios as well as the transitional dynamics of going from one world to the other one.

3.2.1 Steady State Effects

Table 4: SS effects of removing subsidy to housing purchases

	Tau=0.15	Tau=0	Change
GDP	4.37	4.32	-1.3 %
House prices	0.51	0.47	-8.8 %
Labor	4.69	4.63	-1.2 %
Rental Share	0.105	0.156	5.1 p.p.
Share of housing w/ mortg	0.330	0.267	-6.3 p.p.
Rental over housing price	0.012	0.012	0.0 p.p.
Residential inv. over GDP	0.076	0.064	-1.2 p.p.
Weight of constr. in labor	0.138	0.128	-1.1 p.p.
Domestic cons. over total	0.663	0.663	0.0 p.p.

Table 4 shows the steady-state effects of removing a 15% subsidy to housing purchases. We see that the most striking differences come from housing prices, the rental share, and the share of housing purchased with mortgages. In particular, we see that the removing the subsidy makes the rental share increase by more than 5%. On the other hand, the share houses bought by borrowers decrease because, in relative terms, they find now more profitable to rent. As a consequence, house prices fall by almost 9%. Residential investment falls and also GDP does, because of the housing sector contraction.

3.2.2 Transitional Dynamics (Anticipated vs non-anticipated)

Figure 1 shows the transitional dynamics of going from one steady state in which there is a subsidy to housing purchase to the new one in which the subsidy is removed. We distinguish here between two

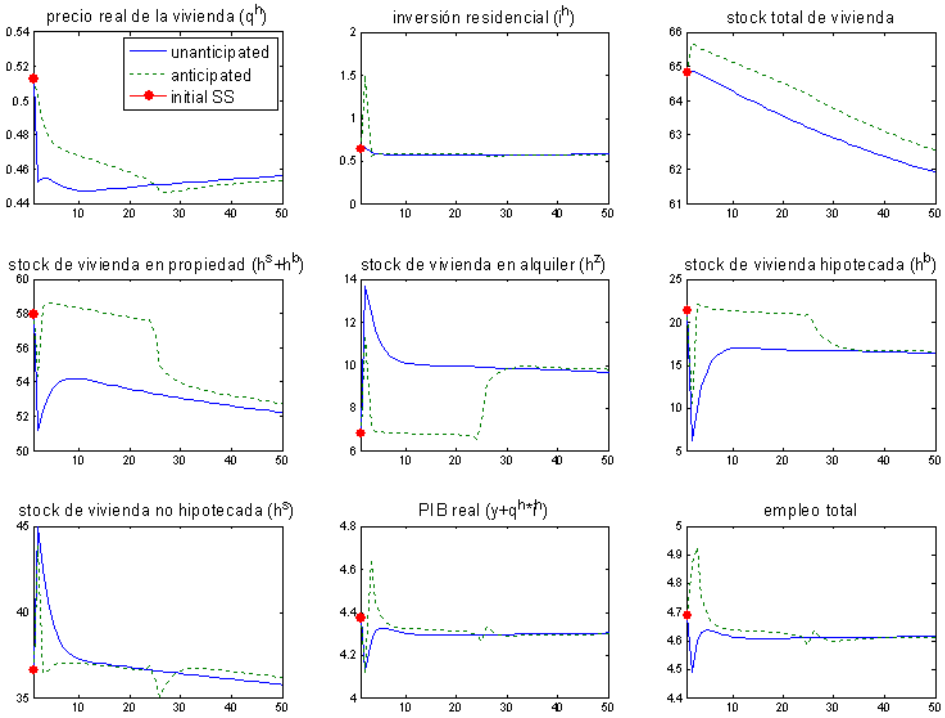

Figure 1: Transitional Dynamics of Removing Housing Purchase Subsidy. Anticipated vs. non-anticipated

cases: one in which the announcement is anticipated and one in which it is non-anticipated. The green line corresponds to the anticipated case whereas the blue line to the non-anticipated counterpart. When the measure is anticipated, the subsidy removal is announced at t=1 and it is effective at t=25. As long as the proposed measure is announced, there is on impact a strong increase in both the housing bought by savers to consume its services and the housing bought to rent. However, the housing purchased by borrowers with a mortgage falls heavily, partly offsetting the positive effect on housing. Nevertheless, the net effect on the total housing demand is positive, which transitorily increases residential investment. From t=2 on, the total housing demand starts to gradually fall. Housing prices decrease very fast as soon as the measure is announced because it incorporates the lower expectation of fiscal benefits. When the measure is effective at t=25, there is a strong increase in the rentals, a heavy fall in houses bought with a mortgage and a slight decrease of housing prices. From this moment on, there is a slow adjustment to the new steady state.

It is very interesting to compare these responses with the ones produced is the measure is non-

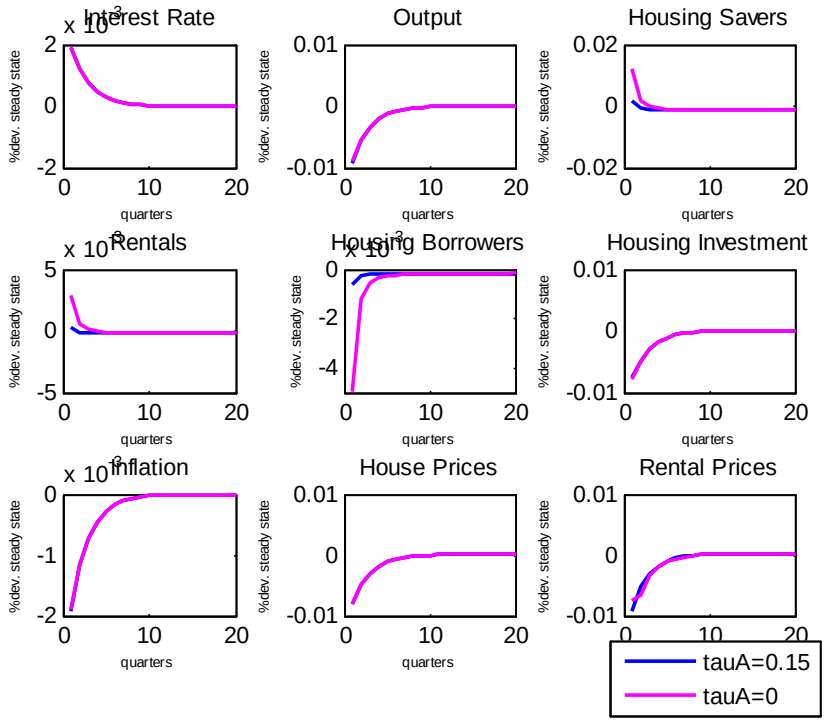

Figure 2: Impulse Responses to an Interest Rate Shock. Effects of Removing the Subsidy to Housing Purchases

anticipated, that is, if it is effective by surprise at t=1. The main difference stems from the effects between t=1 and t=25, which is when the measure is effective in the anticipated scenario. On impact, all the stocks react in a similar manner, although slightly weaker in the anticipated case. However, from t=2 onwards the stocks in the non-anticipated scenario practically return to their initial level. From this moment until the measure is effective they have a flat pattern. Obviously, the housing prices also react less when the measure is anticipated instead of by surprise.

3.2.3 Check dynamic effects of removing subsidy

Figure 2 shows impulse responses to an increase in the interest rate under the two scenarios proposed, one in which there is a subsidy to housing purchases of 15% versus one in which the subsidy is removed. We see that in both scenarios, variables respond as expected after a restrictive monetary policy measure. That is, output decreases, housing purchased with a mortgage decreases, rentals increase, housing investment decreases and inflation and house prices decrease. However, the dynamic difference between both scenarios is not large. We have seen that differences mainly come from steady states.

3.3 Improvement in efficiency in rental market (Rental Share increases to 20%)

As stated in the introduction, it is a goal of the Spanish government to increase the rental share to 20% by 2020. One of the measures that have been taken in order to achieve this aim is to increase the efficiency of institutions to legally enforce rental contracts. In our model, we use as a proxy efficiency in the production of rental services. In order to increase the rental share to 20%, we should increase the parameter A_Z from 1.62 to 4.53 in our model. The next exercise we perform consists of checking the steady state effects and well as the transitional dynamics of increasing this parameter along these lines.

3.3.1 Steady State Effects

Table 5: SS Effects of Increasing Efficiency in Rental Market

	Az=1.62	Az=4.53	Change
GDP	4.37	4.37	−0.1 %
House prices	0.51	0.51	−0.9 %
Labor	4.69	4.68	−0.1 %
Rental Share	0.105	0.20	9.5 p.p.
Share of housing w/ mortg	0.330	0.225	−10.6 p.p.
Rental over housing price	0.012	0.004	−0.8 p.p.
Residential inv. over GDP	0.076	0.075	−0.1 p.p.
Weight of constr. in labor	0.138	0.137	−0.1 p.p.
Domestic cons. over total	0.663	0.663	0.0 p.p.

Table 5 shows what the steady-state effects of increasing the efficiency in the rental market are. We see that in order to increase the rental share to 20%, that is a 9.5% increase, the efficiency parameter has to increase to 4.53. As a consequence of the increase in the rental share, constrained households demand less houses and this depresses house prices and residential investment. We see that the increasing the efficiency in the rental markets affects the economy along the same lines as the removal of the subsidy to housing purchases.

3.3.2 Transitional dynamics

Figure 3 displays the transitional dynamics of moving to a new steady state in which the rental market efficiency has improved in order to increase the rental share to 20%. We observe that on impact there

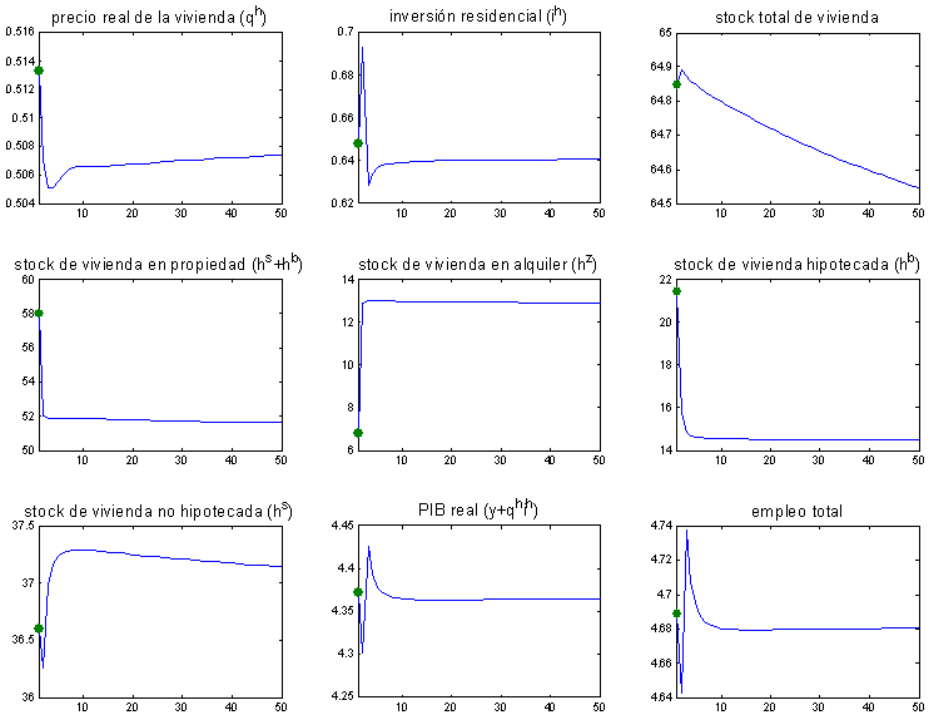

Figure 3: Transitional Dynamics of Increasing the Rental Market Efficiency

is a very strong increase in rentals, accompanied by a great fall in the housing purchased by borrowers. Savers also increase their housing demand because housing prices slightly decrease, however this increase is not enough to avoid that the total stock of owner-occupied houses falls.

4 Concluding Remarks

In this paper, we have built a two-country DSGE model with housing and collateral constraints focusing on the differences between housing purchases and rental. We have calibrated one of the countries for Spain and have explored how different policy measures affect the economy. We find that removing the housing purchases subsidy that has been present in Spain during recent years downsizes the housing sector and increases the rental share. It also decreases housing prices although the effect is milder if the shock is anticipated. The second experiment that we perform is increasing the rental market efficiency so that the rental share goes to 20%. We find that changes in the economy are along the same lines as the previous measure analyzed.

For further research, we would like to more realistic calibrate the second country so that we can also perform experiments for other countries, such as Germany, where the rental share is very large and fiscal measures favor rents. We would also like to evaluate the welfare implications of different taxations on the housing and rental markets.

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