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ABSTRACT: We study the inter-temporal spending behavior of Spanish local governments during the last housing boom (1997-2006), a period of substantial short-run momentum in housing-construction revenues. We argue that the unprecedented growth in these revenues might be one of the reasons underlying the increase in the sensitivity of local government spending to (predictable) revenue changes. To detect evidence of this, we study whether local spending decisions are consistent with forward-looking behavior, working within the framework provided by Holtz-Eakin et al. (1994). Our principal findings are: (i) Local spending shows substantial sensitivity to predictable changes in revenues, suggesting that Spanish local governments did not behave as fully forward-looking agents. (ii) The departure from this benchmark was much higher in those years and/or in those housing markets in which the housing boom was most intense. (iii) The sensitivity was not as great to changes in housing construction revenues as it was to changes in ordinary revenues, but this distinction became blurred as the boom intensified.

JEL Codes: D91, H72

Keywords: Local government, inter-temporal spending behavior, housing cycle

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1. Introduction

The rise and subsequent collapse in housing prices in many countries since the mid-1990s has been of an unprecedented magnitude. In the US, housing prices rose by around 86% (in real terms) between 1996 and 2006 (and by around 50% in the six-year-period ending in 2006), before falling by 30% in the years that followed (Shiller, 2007). In Spain - the focus of this study - the boom was even more spectacular, with a real price increase of about 150% for the whole period, and of 90% in the period 2000 to 2006 (Ministerio de Fomento, www.fomento.es).

The crisis had a particularly adverse effect on public finances, above all in places heavily reliant on cyclical revenue sources (Ter-Minassian and Fedelino, 2010). Given that the current crisis has been strongly conditioned by the collapse in the housing market, governments overly reliant on housing-related tax revenues have been hit hardest (Martínez-Vázquez *et al.*, 2010). In the US, the question as to whether its property tax revenues are affected by the housing construction cycle has been raised, with a number of recent papers concluding that the impact of the contraction in this market, while varying across states, has not, in general, been especially acute (see Doerner and Ihlanfeldt, 2011; Lutz *et al.*, 2011; Alm *et al.*, 2011; and Skidmore and Scorsone, 2011). While the stability shown by Spain's local property tax is quite remarkable, the country's regional and local governments obtain revenues from a number of additional housing-related sources (see section 2 for more details). In most instances, these sources do not depend on the stock of housing (as the property tax) but rather on the flow of housing construction (the case of the land transaction tax[1]), which makes them particularly volatile. Regional and local government revenues generated by housing construction have been estimated to have fallen by two thirds in the first two years of the property crash (Solé-Ollé and Viladecans, 2011). Thus, in Spain, the bursting of the housing bubble was accompanied by a burst in the housing-construction revenue bubble.

The impact of the collapse suffered by these sources of revenues on local budgeting during the crisis years depended to a great extent on just how the governments had behaved during the boom. Governments that had dedicated these revenues to current spending (in particular, to meeting staff wage bills) had to face a more painful adjustment than those that had used them to finance capital projects, build up reserves, or reduce their overall debt (see, for example, Sobel and Holcombe, 1996). Fully forward-looking governments, aware that these revenue flows would not last indefinitely, chose to save, while others were tempted to

[1] Land transaction taxes have rarely been studied in the literature. See Dachis *et al.* (2011)for a recent exception.

spend. It is, therefore, somewhat surprising that recent studies examining the impact of the housing cycle on local public finances (see, for example, Alm *et al*., 2011 and Lutz *et al.*, 2011) have focused principally on the situation during the period of contraction, largely ignoring the fact that the seeds of the current problem were sown during the boom years. In other words, while the revenue shortfall is a major concern, in many cases the problem stems from the use governments made of these revenues during the boom years.

In Spain, it is widely recognized that local governments over-spent from their housing construction revenues during the boom and they faced financial problems during the bust. A common media description of what happened during this period was:

> "The municipalities, indebted and without the necessary flow of income from their revenues, see in housing construction their main and most tempting source of finance."
>
> (El País, 10/6/2006)

> "'If this was a firm, it would have closed down by now', said the city mayor. Services have been stopped, payments to workers and suppliers have been delayed for months. Even the members of the council are not being paid. The bursting of the real estate bubble has hit the council hard and real estate revenues have fallen by 96%, resulting in technical bankruptcy."
>
> (Eleconomista.es, 10/2/2011)

It is difficult to assess just how widespread this situation is given the heterogeneity of Spain's local government bodies, the lags in the disclosure of their financial information, and the tendency of the media to focus on the most extreme cases. In this paper we examine the first part of these events, i.e. the spending behavior of Spain's municipal governments during the boom years. In so doing, we seek to answer the following questions: (i) What proportion of the extraordinary local revenues generated during the boom was actually spent? (ii) Did the tendency to spend from these revenues become more widespread as the housing boom intensified? (iii) Was this spending behavior particularly prevalent in the case of the revenues generated by housing construction (that is, did this constitute the 'most tempting' source of revenue)?

To answer these questions, we study whether local spending decisions were consistent with forward-looking behavior. In so doing, we follow the framework proposed by Campbell and Mankiw (1990), as subsequently applied to sub-national governments by Holtz-Eakin *et al*. (1994), Dalhberg and Lindström (1998) and Borge and Tovmo (2009). Forward-looking behavior means that spending decisions are determined by permanent revenues, and that the deficit will absorb any temporary shocks. Any increases in spending should follow a random walk, being insensitive to any predictable increases in revenue. In this basic framework, the sensitivity of spending to revenue increases is, thus, interpreted as evidence of a departure from forward-looking behavior, although other interpretations are discussed in the literature (including, credit constraints and risk-hedging); see, for example, Luengo-Prado and Sørensen, 2008). In this paper, we estimate the degree of sensitivity of local spending to predictable revenue increases, and argue that this result might also be due (at least in part) to the effect of the high growth that construction-related revenues experienced during the housing boom.

We draw on spending and revenue data (1994-2006) for more than a thousand Spanish municipalities in order to estimate an equation that relates the change in spending to the change in revenues, instrumenting this variable with spending and revenue lags. Then, so as to provide evidence of the link between the sensitivity of spending to revenue changes and the housing boom, we examine whether the effect became more marked as the housing boom intensified (i.e., between 2001 and 2006) and whether it was stronger in more dynamic housing markets. We also examine whether the response presented by spending to changes in revenues was greater for housing-construction revenues than was the case for ordinary revenues, and whether this differential effect changed as the boom intensified. The main findings of the paper are: (i) Predictable changes in revenues have a substantial effect on spending, suggesting that Spanish local governments are not fully forward-looking agents. (ii) This effect increased as the housing boom intensified and was more evident in housing markets that presented the steepest trends in housing prices. (iii) At the beginning of the period, housing-construction revenues had just as strong an effect on spending as did ordinary revenues, but this difference disappeared as the boom intensified, above all in the most dynamic housing markets.

We discuss several explanations for these results. Firstly, the political economy literature suggests that the availability of a growing revenue pool could intensify the fight for budget resources, making it quite difficult for a local authority not to spend its budget surpluses (e.g., Talvi and Vegh, 2005; Alesina *et al*., 2010). Secondly, the increased sensitivity of spending to revenue changes as the boom accelerates might reflect the fact that revenue expectations are not fully rational; rather, politicians suffer from 'extrapolation bias', being excessively influenced by recent events and failing to take into sufficient account that the good or lean times cannot last forever (see, for example, Fuster *et al*., 2010). Finally, the lower degree of sensitivity of spending to changes in housing-construction revenues can be explained by the fact these revenues are highly irregular, being kept in all likelihood in a different "mental account" and spent with more restraint (e.g., Shefrin & Thaler, 1988).

The paper is organized as follows. In the next section we provide a more detailed explanation of the role of housing construction revenues in the financing of Spanish local governments and of the effects of the housing cycle on the evolution of these revenues. In section three, we discuss the theoretical arguments that might help to interpret our results. In section four, we describe the methodology and the database. In section five we present the results. The last section concludes.

2. Local budgets and the housing boom

2.1 Local budgets in Spain

Spain consists of more than eight thousand municipalities, although most of them are quite small. These municipalities are multi-purpose governments, and their main expenditure categories cover the traditional responsibilities assigned elsewhere to the local public sector (i.e., environmental services, urban planning, transportation, welfare, etc.) with the exception of education, for which Spain's regional governments have responsibility. Local government's own revenues account for more than 65% of current budget revenues (as of 2006), with the remaining 35% being met by grants, most of which are unconditional. Two thirds of the municipality's own revenues are derived from taxes, with the remaining third coming from a variety of user charges. The main taxes are the *Property tax*, the *Local business tax* and the *Local vehicle tax*, which account for 50, 15 and 15% of tax revenues, respectively. These revenue sources, referred to as *Ordinary revenues* in the rest of the paper, have traditionally been quite stable[2].

However, Spanish municipalities also obtain revenues from what we refer to as *Extraordinary revenues*, most of which are related to housing construction. Here, municipalities levy two further taxes: the *Construction tax* and the *Land transactions tax*. Unlike *Ordinary taxes*, which are dependent on stocks (i.e. assessed value of business, cars or houses), these taxes depend on flows. The *Construction tax* is paid by the owners of a

[2] The *Local business tax* and *Local vehicle tax* are license-type taxes, meaning that revenues are affected by the number of taxpayers but not by the evolution in the amounts filed by each taxpayer. The *Property tax* is also quite stable, property assessment being carried out every ten years, new values being introduced progressively, and with no past experiences of reassessments lowering values. The design of unconditional grants also ensures that they remain stable (see Bosch and Solé-Ollé, 2005).

building under construction in the jurisdiction of the municipality, the tax being levied at a rate that is a proportional to the cost of the project. The *Land transactions tax* is paid by the seller of plot of land (empty or built upon); the tax rate is proportional and the tax base is an estimate based on the assessed value of the land and the number of years since the last purchase. Obviously, when the amount of new construction work is in decline, the revenue generated by the two taxes falls sharply. Then, there are the fees paid by developers or by land owners. *Developers' fees* include *Building licenses* and payments made in exchange for other types of development-related duties[3]. Land owner duties are *Impact fees* used to pay for improvements in already existing urban infrastructures. Finally, municipalities also obtain revenue from *Sales of land plots* donated by the developers, and from *Capital transfers*, earmarked for specific infrastructure projects.

Some comments on the nature of these revenues are worth making at this juncture. First, most of these sources are supposed to be used in the financing of new infrastructure. In theory, the amount raised should match the cost of building that infrastructure (Slack, 2002; Peterson, 2008). If this were the case, no windfall would result. However, this principle is of limited application in Spain, since developers' obligations include the direct funding of some of this infrastructure (e.g. streets), as well as lump-sum donations (in land or in money) that are not computed to match the cost of urban infrastructure. This means that, although on occasions these contributions fail to meet the infrastructure financing requirements, more often than not they generate windfall revenues, especially during housing booms[4]. Second, while some of these revenue sources are earmarked for capital expenses, some are not (see Solé-Ollé and Viladecans, 2011). Spanish local budgeting regulations clearly state that both *Sales of land plots*, *Capital transfers* and *Impact Fees* should form part of the capital budget, and so cannot be used to fund current expenditure[5]. The rule is less clear for *Developers' fees* and while some municipalities adopt sound practices, others do not. Finally, revenues from

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[3] For instance, in Spain developers are obliged to provide basic infrastructure (e.g. streets, sewage systems, lighting), but the municipality can do this directly having first reached an agreement with the developer. Developers are also obliged to give the municipality a part of the developed land (that required for streets plus 10 to 25% of the value of the developed land plots), to be used for public facilities (schools, hospitals), for open space, or on which to build social housing. Developers and the city council can reach an agreement to exchange land plots for additional money payments (see Riera *et al*., 1991).

[4] A recent World Bank report discussing the desirability of using land-based financing instruments also warned of the possibility that these revenues might spill over the current budget during housing booms (see Peterson, 2008).

[5] Note, however, that even in this case a windfall originating from such a source could result in higher current spending if the municipality is running an operating surplus (i.e. a lower surplus will be needed to fund the same level of investment while issuing the same level of debt).

the two housing construction taxes form part of the current budget, despite their great variability.

2.2 The effects of the housing boom

The impact of the last housing boom on the composition of the revenue budget of Spain's municipalities is illustrated in Table 1. Data are shown for the years 1994 and 2006. The table shows that between the lowest point and the peak in the cycle, *Extraordinary revenues* increased by almost 10% of non-financial revenues (from 19 to 29%), and that this growth was mostly attributable to the increase in the share generated by *Housing construction revenues*. The component of *Housing construction revenues* that increased most was the *Sales of land plots*, which saw its budget share increase threefold (from 2.2 to 6.6%). *Housing tax revenues* also increased substantially, from 5.4 to 9% of the budget.

[Insert Table 1]

The rise in *Housing construction revenues* is even more evident if we examine their evolution over the period. In Figure 1 we can see how they increased more than threefold in real terms during the boom, before losing nine tenths of their value during the contraction. In 2010, these sources accounted for around 70% of the revenues that they had been providing in 1994 when the boom began. This pattern closely matches the one presented by the number of building permits issued, which increased fourfold during the expansion and fell to 40% of its initial value by 2010. The rise in real housing prices (see Figure 1) also provides a good match with the evolution in *Housing construction revenues* during the boom, but not during the period of contraction. The reason for this is that most of these tax bases depend on the actual housing transactions taking place; if there are no transactions, there are no revenues regardless of whether prices are high or low; if there are transactions, higher prices will generate more revenues.

The expansion period can be divided into two different sub-periods. During the first one of these (before 2002), housing construction rates grew quite rapidly but stagnated towards the end of the sub-period, while housing prices grew just moderately throughout these years. As a result of these two forces, *Housing construction revenues* also grew throughout the period but at rates that were much lower than in the second sub-period. After 2002, both housing construction rates and housing prices grew extremely rapidly, and as a result the growth trend in *Housing construction revenues* was also much steeper.

[Insert Figures 1 & 2]

The evolution in the various components of the housing-construction revenues was even more spectacular, with revenues from *Sales of land plots* and *Housing construction taxes* growing at a rate above the average (see Figure 2). *Housing construction fees* also grew, but not at such a spectacular rate. By contrast, Figure 2 shows that the evolution in revenues from *Ordinary revenues* remained largely stable[6]. This is an important factor to bear in mind: the effect of the housing boom on revenue growth was extraordinary only in the case of *Housing construction revenues*. These revenues grew at an annual rate of 14.6%, while *Ordinary revenues* grew at just 5.4%. Furthermore, the acceleration in growth in the second sub-period (after 2001) was much more apparent in the case of *Housing construction revenues* (with annual growth rates of 6.5% and 18.7% in 1996-2001 and 2002-2006, respectively) than it was in that of *Ordinary revenues* (with growth rates of 4.8% and 6.4%, respectively).

3. Interpretative framework

3.1. Are politicians forward-looking agents?

Our benchmark for analyzing the spending decisions of local governments is the purely rational forward-looking model. Rational local planners are assumed to choose public consumption to maximize an inter-temporal utility function, reflecting the preferences of a representative voter, subject to a budget constraint. If, in addition to this, politicians are able to foresee the future evolution of revenues perfectly, then the following expression for public consumption growth holds (see Hall, 1978):

$$\Delta C_t = \mu + \varepsilon_t \quad , \tag{1}$$

where C_t is consumption of non-durable goods and services, t is the year, μ is a constant which identifies such factors as the interest rate and time preferences, and ε_t is a random error term which can be interpreted as the innovation between time t-1 and time t in total 'permanent revenues'. This implies that consumption growth is a random walk and that no variables known at the beginning of t-1 should have an effect on consumption growth. Thus, a potential test as to whether local politicians are fully forward-looking agents would involve regressing consumption on information known in t-1. Holtz-Eakin and Rosen (1991 and

[6] Although not shown here, the evolution in the various taxes making up *Ordinary taxes*, as well as that of *Current transfers*, was quite similar to the average behavior presented by the group.

1993) use this approach (see, for example, Hall, 1978) to test whether the lag structure is consistent with forward-looking behavior in the case of labor and capital spending by US municipalities[7]. Their results suggest that small municipalities do behave fairly rationally, but that this is not the case of big cities. A weakness inherent to this approach, however, is the lack of information it provides about the degree of departure from rational behavior.

A method that serves to overcome this shortcoming was proposed by Campbell and Mankiw (1990). Their model nests two possible behaviors, rational and 'myopic', in a single equation. Consumption growth for rational 'forward-looking' politicians would follow expression (1). 'Myopic' local planners would consume all of their current yearly revenues, meaning that consumption growth would match current revenue growth (i.e., $\Delta C_t = \Delta R_t$). These two behaviors can be nested in one equation by assuming that a proportion λ of local governments tend to act 'myopically' (or that the typical government acts 'myopically' a λ % of the time):

$$\Delta C_t = \eta + \lambda \Delta R_t + u_t \quad , \qquad (2)$$

where $\eta = (1-\lambda)\mu$ and $u_t = (1-\lambda)\varepsilon_t$. A problem encountered when estimating this equation is that ΔR_t might be correlated with the innovation in permanent income, thereby biasing the estimation of λ. The direction of the bias is unknown[8]. Overcoming this problem requires the use of instrumental variables techniques. Since the error term in (2) is the innovation to 'permanent revenues', variables dated *t*-1 or before should not be correlated with 'permanent revenues' and as such constitute potentially good instruments. The paper by Holtz-Eakin *et al*. (1994) was the first to apply this methodology to local government data. Using aggregate state and local spending in the US, they were able to reject the hypothesis that politicians behave in a rational forward-looking manner. In fact, they report a λ coefficient equal to one: the growth rate of state and local spending on non-durable items is exclusively determined by the current level of resources. By contrast, Dalhberg and Lindström (1998), drawing on a

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[7] The literature examining the dynamic aspects of local budgeting is much broader but does not deal with the issues that concern us here. Buettner and Wildasin (2006), Solé-Ollé and Sorribas-Navarro (2011) and Craig and Hoang (2011) estimate dynamic responses to different types of shocks but do not focus on the difference between permanent and transitory shocks. Other papers studying the fiscal adjustment of sub-national budgets include Poterba (1994) and Rattso and Tovmo (2002). Holtz-Eakin *et al.* (1989) and Dalhberg and Johansson (1998) focus on the causality between revenues and expenditures.

[8] It is tempting to suggest that the bias will be positive (i.e. shocks in current revenues correlate with innovations to 'permanent income'). However, there are also reasons to expect the opposite. First, as Campbell and Mankiw (1990) show, even in the case of private consumption, the bias can be negative, depending on the stochastic properties of income. Second, in the case of government consumption, the prediction of the bias is more complex, since it also depends on the kind of policy response to the revenue shock (see, for example, Holtz-Eakin *et al.*, 1994, and Donovan, 2009, for a discussion). All papers that have estimated this equation using public spending data find evidence of a negative bias.

sample of 265 Swedish municipalities, report a λ coefficient of around 0.1, a figure that they attribute to the different methodology employed (individual vs. aggregate data). However, Borge and Tovmo (2009), with a sample of 411 Norwegian local governments, estimate an average λ coefficient of 0.4. And more recently, Donovan (2009) has re-estimated the λ-model for a sample of 506 US cities, finding a higher value for λ (of around 0.6).

3.2. The effect of the housing boom

One of the main shortcomings of the λ model is that it operates as a black-box, insofar as a significant estimate of λ can be interpreted not only as evidence of 'myopia', but also as the result of other causes such as credit constraints or risk-hedging (see, e.g., Luengo-Prado and Sorensen, 2008). Thus, today the parameter λ is typically interpreted as a measure of 'excess sensitivity' of consumption to predictable income changes (relative to the non effect of a fully forward-looking behavior), but not necessarily as indicative of the presence of irrationality.

Studies examining local spending data have also evolved in this direction. Holtz-Eakin *et al*. (1994) do not discuss why their results should suggest that US politicians are completely non-forward looking. Dalhberg and Lindström (1998) provide some evidence that the value of λ might differ in line with such factors as geography or the time period, but they do not link these results to any particular theory. More recently, Borge and Tovmo's (2009) study was explicitly designed to disentangle two potential explanations for this type of behavior: credit-constraints and the short-sighted fiscal behavior of fragmented coalition governments. They find variation in the λ parameter that ranges from 0 to 0.4 depending on the prevalence of these traits. Donovan (2009) also looks at the possible causes of this behavior, finding values of λ between 0 and 0.8, depending on institutional traits such as debt constraints, term limits, citizen initiatives or partisanship. In this paper we forward an alternative explanation (one not previously discussed in the literature) for the 'excess sensitivity' of local government consumption to revenue changes. We suggest that the sensitivity of spending to (predictable) revenue changes might increase in periods of very rapid revenue growth, such as the recent housing boom. Below we discuss two possible explanations, a *Political economy* explanation and one based on *Behavioral* arguments. We also discuss whether we are able to draw any conclusions regarding the effect on spending of increases in a given revenue source (i.e., *Housing construction revenues*).

Political economy arguments. There are several political economy models that might be able to generate short-sighted fiscal policies and which are, at the same time, consistent with such behavior becoming more intensified with a revenue boom. Here we identify two that might be considered most pertinent to our case. First, according to Alesina *et al.* (2010), short-sighted fiscal policy might be the result of agency problems. In their model, voters face corrupt governments that can appropriate part of the revenues for unproductive consumption. Although voters can replace politicians that take too much in rents, they are unable to eliminate political rents completely. Furthermore, voters lack information about the amount of debt the government accumulates, so when they see the economy booming they do not believe the government is going to save these revenues and they demand higher utility for themselves in the form of higher spending. Thus, in the terms of the authors, 'pro-cyclical' fiscal policy (i.e. an increase in government spending during booms and excessive government borrowing) arises from voters' demands. Fiscal policies are not forward-looking, but voters are completely rational, since this is the only way to 'starve the Leviathan'. The authors admit that such behavior could be present at any time, but they stress that it might well be exacerbated by a revenue boom.

Second, the lack of forward-looking behavior could be the result of different social groups fighting for a share of public spending, as common-pool models of budgeting have pointed out (e.g. Von Hagen and Harden, 1995). Several authors suggest that a revenue boom might amplify this effect. This is the so-called 'voracity effect' (see, for example, Tornell and Lane, 1998 and 1999; Talvi and Vegh, 2005). When there is a huge increase in transitory revenues it is difficult for a government not to spend them given that large surpluses fuel the spending demands of different social groups. Under such circumstances, controlling spending becomes especially difficult, since the finance minister cannot argue that 'there is no money' to reject the petitions of ministers and agencies. There is evidence from some countries that the huge increases in revenues that followed the rise in oil and commodity prices were translated into huge increases in spending (see, for example, Lane, 2003). The housing boom might have had similar effects on the spending decisions of Spanish municipalities.

Behavioral arguments. It is held that neither voters nor politicians are able to forecast future revenues correctly, especially in hump-shaped cycles. Some recent studies in macroeconomics show that the behavior of a range of economic variables is consistent with agents that have formed their expectations using overly-simplified models of the economy. These models suffer from 'extrapolative bias', in the sense that future values are excessively based on the most recent evolution of a variable, and so they fail to account sufficiently for the fact that good or bad times will not last forever. For example, Fuster *et al*. (2010) coin the term 'natural expectations' to describe the formation of expectations as a weighted average between 'rational expectations' and 'intuitive expectations', which are forecasts based on these over-simplified models of the economy. This behavior generates systematic forecasting errors, which are typically negative during periods of boom (individuals are pessimistic and continue to extrapolate the changes experienced in the earlier period of bust) and positive during the bust (agents are optimistic and continue to expect the growth enjoyed during the last phase of the boom)[9]. Fuster *et al*. (2010) survey evidence of this kind of behavior for different sectors, and report many examples for the housing sector. Indeed, 'irrational expectations' have been shown to exist among housing consumers and builders during the boom (see, for example, Shiller, 2000; Case and Shiller, 2003)[10]. Thus, local governments may well have come to hold similar sorts of expectations to those held by other agents; after all, they are also key actors in land development, being responsible for the design of zoning regulations (see Solé-Ollé and Viladecans, 2012) and, thus, for the decision to permit more development to take place[11]. Forward-looking agents update their spending decisions as these errors are revealed, increasing spending if the error is negative (during the boom) and decreasing spending if the error is positive (during the bust). If the growth in revenue correlates with the magnitude of the forecasting errors then the result will be an increase in the sensitivity of spending to revenue changes (see, for example, Giamboni *et al*., 2010).

Housing construction revenues. The theories discussed above are consistent with a greater sensitivity of local spending to revenue changes in periods (places) in which revenues are growing fastest. But, should we also expect current changes in certain specific revenues (i.e., those related to housing construction) to have a greater effect on spending than others? In principle, this effect is not expected if politicians are fully forward-looking agents. However, our conclusion might change if they behave differently. For example, adopting a behavioral perspective, Shefrin and Thaler (1988) provide a theoretical rationale for short-

[9] We are unable to measure the revenue forecasting errors for each municipality. However, aggregate budget and outlay data for the revenue derived from *Housing construction taxes* indicate that forecasting error were indeed negative during the boom, ranging from 2 to 4% of the budget between 1995 and 2001 and from 4 to 7% between 2002 and 2006, and positive during the bust (13% in 2006 and 30% in 2007).
[10] See also Himmelberg *et al.* (2005) and Glaeser et al. (2010) for evidence of the role of 'irrational behavior' in explaining the recent boom and bust in housing prices.
[11] For instance, local governments also passed more expansive land use plans (converting huge amounts of land from rural to urban use) as the housing boom increased in intensity. The 'irrational' behavior of these plans is apparent from the fact that a large proportion of this land today stands vacant (see Solé-Ollé and Viladecans, 2010).

sighted behavior based on research conducted in psychology[12]. They show that 'excess sensitivity' of consumption out of current income can occur because of a lack of willpower and self-control, which enhance the temptation to consume from current income at the expense of the rational choice of smoothing consumption over the life-cycle. According to these authors, current income, wealth, and future income are located in different mental accounts, the propensity to spend out of current income being higher than that for wealth, which is in turn higher than that for future income. Moreover, in their theory, consumers have a different propensity to consume out of different income sources. For instance, in our case, revenue sources, which are classified as extraordinary or irregular, are placed in a different mental account and are not consumed in the same proportion as ordinary or regular sources of revenue. So, in principle, and since *Housing construction revenues* are markedly irregular (the taxable item not being recurrent and revenues varying considerably from one year to the next), they would probably be kept in a different mental account and saved in a higher proportion, even if there are no formal budgetary requirements to do so[13]. Thus, in normal times, we can expect the sensitivity of spending to changes in *Housing construction revenues* to be lower than that for other types of revenue. Likewise, in normal times, we should also expect municipalities that rely more heavily on the construction industry for their revenues to have a lower propensity to spend out of their current revenues.

However, the period that concerns us here can hardly be described as 'normal times'. As we have seen in the previous section, the trend in local revenues during these years (and, especially, after 2001) was quite simply spectacular. In such a situation, local governments might have convinced themselves that *Housing construction revenues* would continue to grow at these high rates into the future. Thus, as the boom intensified, it is conceivable that *Housing construction revenues* would have been progressively shifted from the irregular or extraordinary 'mental account' to the current one, which would have increased the propensity to spend out of these revenues.

[12] See Hines and Thaler (1995) for an application of the mental accounts theory to explain the 'flypaper effect'. See also Heyndels and Van Driessche (2002) for an application to account for the effect of different types of windfall.

[13] Other differences between these revenues and *Ordinary revenues* might influence the tendency to over-spend out of them. For instance, *Construction taxes* are indirect taxes that are usually shifted to the consumers and which are not particularly salient as they reflect the net price of a house. Furthermore, they are not recurrent, so their degree of visibility is low. However, it is not clear that these traits make this type of windfall less visible than those derived from *Grants* or from automatic increases in the tax bases of *Ordinary taxes* (see, for example, Ladd, 1993, and Henydels and Van Driessche, 2002).

4. Econometrics and data

4.1. Econometric framework

A more general specification of equation (2), which takes into account the panel structure of the data, would be:

$$\Delta C_{it} = \eta_t + Z_{it}^{'}\beta + \lambda \Delta R_{it} + u_{it} \qquad (3)$$

where η_t are year fixed effects, controlling for time-varying interest rates, and Z_{it} is a vector of control variables, controlling for differences in preferences. We might also consider the possibility of controlling for municipality fixed effects. Various authors do not, in fact, consider this necessary, given that the variables have already been differentiated (Dalhberg and Lindstrom, 1998), while others do but report no great effect on their results (Borge and Tovmo, 2009). In our case, a Wald test indicated that the municipality fixed effects were not jointly statistically significant so we did not include them in the equation. Furthermore, by controlling for year fixed effects and several control variables, other types of geographical fixed effects (by region and by housing market) were not statistically significant.

The main problem to be derived from the estimation of equation (3) is that ΔR_t might be correlated with the innovation in permanent revenues, biasing the estimation of λ. As explained earlier, the direction of the bias cannot be guessed, so resolving the problem requires the use of instrumental variables techniques. Since the error term in (3) is the innovation to ‘permanent revenues’, variables dated *t*-1 or earlier should not be correlated with ‘permanent revenues’ and as such are potentially good instruments. There are, however, practical reasons for not using the first lag: (i) current spending might include spending on durables and the dynamics of capital spending are much more complex (see Holtz-Eakin and Rosen, 1993), (ii) budget decisions might be sluggish, reflecting incrementalism.

Thus, we estimate the equation using the GMM method developed by Holtz-Eakin *et al*. (1988), lagging by at least two periods the increases in both current revenues and current spending. When estimating the equation with the breakdown of current revenues, we also lag the increases in the different revenue sources by two or more periods. In line with Campbell and Mankiw (1990), we also use the twice-lagged instrument of operating savings (i.e. *R*-*C*). The reason for including this instrument (in addition to the lags of spending increases) is simply to increase the explanatory power of the instruments. Furthermore, so as to avoid instrument proliferation (see Bowsher, 2002), we restrict the maximum number of lags to six. To assess the validity of these instruments we use the Hansen test and the Arellano and Bond autocorrelation tests. Finally, note that we report the first-stage GMM results with standard errors corrected for heteroskedasticity and that the second-stage results (available upon request) differ little from those of the first stage.

4.2. Sample and variables.

Sample. We estimate these equations for the period 1994 to 2006 with data taken from Spanish municipalities with more than 5,000 residents. The sample period is determined by data availability - 1994 was the first year the Spanish Ministry of Economics supplied micro data on municipal budget outlays and 2006 was the last year data were available when this study was initiated (coinciding with the peak in the housing boom – the period which interests us here). The original database includes most municipalities with a population greater than 5,000 residents and a representative sample of smaller municipalities. However, as the smallest municipalities included vary each year, this means there are a considerable number of gaps in the database. This would clearly impair the quality of the dynamic GMM estimator we use. For this reason, we focus only on municipalities with more than 5,000 residents, which nevertheless accounts for more than 90% of the Spanish population. Yet, even though we use these larger municipalities, the panel remains unbalanced. The average number of observations per municipality is seven; the maximum is ten. We have discarded the municipalities without at least five consecutive observations. As a result, the number of observations grows over time (i.e. 931 in 1994; 1,024 in 2001; and 1,256 in 2006). We also undertook the estimation with a balanced panel, but the results do not change.

Dependent variable. The dependent variable is the increase in current spending excluding interest payments (see Table A.1 in the appendix for definitions and data sources). This includes spending on personnel, purchases and transfers, and provides a good match with the definition of 'non-durable consumption' adopted in the literature. The revenue variables adopted are used as previously defined (see Table A.1 for details). Both spending and revenues have been divided by lagged current revenues. Even if the theory holds for levels, some scaling of the variables is required so as to avoid any problems arising from the log-linearity of the current spending and revenue variables (see Campbell and Mankiw, 1990). Previous studies scale the variables by employing them in growth rates (see Dalhberg and Lindstrom, 1998) and justify this choice by noting that equation (1) should hold in logs under specific assumptions about the utility function and the evolution of interest rates (Hansen and Singleton, 1983). Both approaches work equally well, but scaling using lagged current revenues has the advantage here of facilitating the estimation of the effects for different revenue sources when also using a linear equation. Whatever the case, in our discussion of robustness (see below), we also examine results obtained when using alternative scaling methods, including growth rates and per capita figures.

Control variables. The list of control variables includes: % *younger than* 18, % *older than* 65, % *unemployed*, % *educated*, log(*population*), log(*land area*), Δlog(*population*) and Δ% *unemployed*. These variables control either for differences in time preferences and/or for the growth in private income. We do not control for the amount of capital spending since many papers have shown that there is evidence that durable and non-durable goods are separable in the utility function (see, for example, Holtz-Eakin *et al*., 1994) and because in our case capital spending cannot be considered an exogenous variable.

Splitting the sample. In order to investigate whether the intensification of the housing boom increased spending sensitivity to revenue changes, we split the sample in two ways. First, we provide a separate analysis for the years before and after 2001. Figure 1 suggests that the trend in *Housing construction revenues* accelerates after this year. Second, we divide our sample into two, using as our criteria: (i) the growth rate in *Current revenues* in the housing market where the municipality lies; (ii) the growth rate in real housing prices in that housing market[14,15]. For practical reasons (i.e. information on housing prices and permits is only available at this level of aggregation), we use the 50 Spanish provinces (Eurostat NUTS III regions) to identify our housing markets. The provinces identified in (ii) are either those along the Mediterranean coast, or those that include or share a border with the main urban areas outside the Mediterranean coast, namely Madrid, Zaragoza, and Bilbao[16]. We refer to this sub-sample as *Coastal and Urban* housing markets[17]. Criterion (i) does not include exactly the same provinces, with some of the above excluded and others included, but the correlation between both criteria is high. We have run simple regressions between log(*Current revenues*) and three dummies: (i) equal to one for coastal and urban housing markets, (ii) equal to one

[14] The idea here is that even if a particular municipality is not experiencing development growth in a particular year or period, voters and politicians would expect this to happen in the future if municipalities in the same housing market had this experience in the recent past. Shiller (2000) shows that 'irrational expectations' regarding the evolution of housing prices affect also individuals that live in place that have still to be affected by the price increases. See also Decoster and Strange (2010) for an analysis of herding behavior among developers.

[15] We also did the same exercise using the growth rate in housing permits, with exactly the same municipalities classified in the two groups.

[16] The other big urban areas (i.e. Barcelona, Valencia, Málaga and Sevilla) are in the Mediterranean coast.

[17] Real housing price appreciation between 1994 and 2006 was 190% and 90% in these two samples, respectively. The top three housing markets were Malaga, Tarragona and Baleares (all in the Mediterranean coast) where real houses prices grew by 274%. The bottom three housing markets were Teruel, Ourense and Soria (all rural areas of the interior of Spain) with real house price appreciation of 47%.

for years after 2001, and (iii) an interaction between the two dummies. The R^2 of this regression is 0.57 and the three coefficients are statistically significant at the 99% level, after clustering the standard errors at the provincial level. The results indicate that *Current revenues* grew in real terms at an average growth rate of 4.7% and 2.6% over the period 1996 to 2001 in *Coastal and Urban* municipalities and in the rest of the sample, respectively. These growth rates climbed to 8.2% and 5.9% during the period 2002 to 2006. We can conclude, therefore, that the differences between the revenue trends of these groups are statistically significant.

5. Results

Tables 2 to 5 show our results. In Table 2 we display our basic results when estimating spending sensitivity to revenue changes for the full period and for the sample of municipalities, and without allowing for the effects to depend on revenue structure. Table 3 shows the results when we analyze the two sub-periods, 1997-2001 and 2002-2006, and the sub-samples of municipalities (based on housing market growth rates) separately. Table 4 presents the results when allowing the degree of forward-looking behavior to differ according to growth in either *Ordinary revenues* or *Housing construction revenues*. Finally, Table 5 reports the results when analyzing the effects of the different types of revenue on the several samples introduced in Table 3 (i.e., sub-periods and different types of housing market).

5.1. Basic results

The first two columns in Table 2 show the OLS results. Column one includes the year fixed effects and column two adds a full set of control variables. The third and fourth columns present the GMM results. Column three includes the year fixed effects only and column four adds the control variables. In all cases the coefficient of the increase in *Current revenues* is positive and statistically significant, and the inclusion of the control variables does not alter the results (be it in the OLS or in the GMM estimates). Hansen's J test suggests that the instruments are exogenous, and this is corroborated by the Arellano and Bond autocorrelation tests (Arellano and Bond, 1991). The GMM coefficients are twice as high as the OLS estimates, suggesting that Spain's local governments depart substantially from a fully forward-looking behavior. The GMM coefficient has a value of around 0.6, which is similar to the average estimates reported in a number of recent papers (Borge and Tovmo, 2009;

Donovan, 2009). The negative bias of the OLS results is also in accordance with findings elsewhere in the literature.

[Insert Table 2]

5.2. Housing boom intensity

Table 3 analyzes whether these previous results are related to the intensity of the housing construction boom. The first two columns present the results for two different periods: 1997-2001 and 2002-2006. The tests suggest that the empirical specification works well irrespective of the period under analysis. The results are also qualitatively similar for both periods: the spending of the Spanish municipalities is more sensitive to revenue changes in all these years. Note, however, that the sensitivity was greater between 2002 and 2006 than it was in the earlier period (i.e., coefficient of current revenues of 0.86 compared to that of 0.6), which is consistent with the belief that the acceleration in the housing boom underpinned the tendency of Spanish governments to behave in a manner that was not forward-looking.

[Insert Table 3]

The next four columns in Table 3 present the results for two sub-samples of municipalities according to the growth rates of their housing markets. Columns three and four show the results when the sample is divided according to the growth rate recorded by *Housing construction revenues* ("high" indicates that the growth rate in the particular housing market was above the median for the country, while "low" indicates that it was below the median). The last two columns show results for *Coastal & Urban* municipalities (i.e., those lying in dynamic housing markets, located in coastal or in high-growth, non-coastal, urban areas) and for all other municipalities. The results obtained are the same in both cases, and are even more extreme than those presented in the first two columns (sample divided by sub-period). Spending sensitivity is much higher in the *High-growth* sample than it is in that of *Low-growth* (i.e., coefficient of current revenues of 0.83 compared to that of 0.49). It is also much higher in the *Coastal & urban* sample than it is in the rest of the municipalities (i.e., coefficient of 0.84 compared to that of 0.46). Thus, these results suggest that it was the intensity of the housing boom that was responsible for the increased divergence shown in Spain's local spending decisions from any forward-looking behavior.

5.3. Housing construction revenues

Table 4 shows the results when different revenue sources are allowed to have different effects on spending. Here, likewise, the tests used support our specification in all cases. Column one analyzes the effects of *Ordinary revenues* and *Housing-construction revenues* separately, while column two breaks *Ordinary revenues* down into *Current grant revenues* and *Tax revenues*. Our main finding is that an increase in *Ordinary revenues* has a much greater impact on spending than an increase in *Housing construction revenues*, the coefficients being around 0.75 and 0.16, respectively. As explained above, *Housing construction revenues* are extraordinary revenues, comprising chiefly taxes and fees whose payment is non-recurrent. It is, therefore, not entirely surprising that local governments are more forward-looking when they spend out of such revenues. Our other finding is that the effect of *Current grants* is greater than that of *Tax revenues*. However, although the point estimate is higher for *Current grants* (0.87 vs. 0.71) a Wald test is not able to reject the equality of both coefficients ($\chi2(1)=0.29$, p-value=0.587). Columns three and four in Table 4 include, as additional variables, the revenues derived from the *Capital budget*. In theory, these revenues should not be used to fund current spending; in practice, however, the effect is uncertain, given the possibility of reducing the levels of operating savings in response to an increase in capital revenues. Our results do not support this hypothesis: neither aggregate *Capital revenues* nor its components (i.e. *Capital grants* and *Capital housing-construction revenues*) have an impact on current spending. Additional results (not shown here for reasons of space) for a sample of municipalities presenting positive operating savings show coefficients that present the same sign and, in the case of capital grants, values that are a litter higher and statistically significant at the 10% level. This negative coefficient would appear to imply that more capital grants force municipalities to reduce their current spending so that they might raise their savings and adhere to the matching requirements that are typical of many capital grants. However, the results do not support the idea that revenues derived from *Sales of land plots* are used to fund increases in current spending. This result is important since, as we have shown in section 2, these specific revenues are those that grew the most during the boom (recall Figure 2). It is reassuring to know that these revenues were allocated to either deficit reduction or investment.

[Insert Tables 4 and 5]

Table 5 shows how the results for the different revenue sources change when we divide the sample according to the same indicators of housing boom intensity used in Table 3. As in Table 3, the effect of changes in revenue on local spending increases with the intensity of the boom. Note, however, that this increase is small in the case of *Ordinary revenues* (the coefficients increase by about 0.17 between sub-periods), but very high in the case of *Housing construction revenues*, where the value of the coefficient is multiplied by four. Thus, even though local governments sought not to spend much from these revenues (after all, they were still extraordinary), the restraint typically applied was weakened as the housing boom intensified. Note also that the effect of increases in *Housing construction revenues* is very high in the *High growth* and *Coastal & Urban* subsamples of municipalities. The coefficient of *Housing construction revenues* is very high in these places (0.7-0.9 vs 0.15-0.16), and is in fact very similar to that found for *Ordinary revenues* (0.7-0.8 vs 0.9).

Our results suggest that in those housing markets where the boom has been most intense, the typical restraint applied in the management of extraordinary revenues derived from housing construction has been largely abandoned, given that the sensitivity of spending to changes in these revenues is very similar to that in traditionally more stable sources. In other housing markets, where construction rates and housing prices have grown more slowly, local governments still exercise some restraint when determining the proportion of these extraordinary revenues that should go to fund increases in current spending.

Additional results. In this section we discuss some additional results, albeit that for reasons of space we omit any tables (results available upon request). First, we replicated the results of the effect of aggregate increases in *Current revenues*, computing this and the dependent variable both as growth rates and in per capita terms. In both cases, the results are virtually indistinguishable from those presented above. Second, we replicated the estimations reported in Tables 3 to 5 for each year in the period 1997 to 2006; the sensitivity of spending to changes in *Current revenues* as well as to that in *Housing construction revenues* presents a U-shaped curve. Thus, while sensitivity was high between 1997 and 1999, it fell between 2000 and 2001, becoming higher again after this year before rising steeply until the end of the period. The shape is similar to that displayed by both *Building permits* and *Housing construction revenues* in Figure 1. It would seem that the degree of over-spending is related to the intensity of the housing boom. We also divided the sample into four additional sub-samples, one for each quartile of the variable used in the earlier division (be it *Current revenues* or *Housing prices*). The coefficient obtained for *Housing construction revenues* is zero in the lower quartile, around 0.1 and not statistically significant in the second quartile, around 0.3 and significant in the third quartile, and around 0.8 and very similar to that obtained for *Ordinary revenues* in the top quartile. This reinforces the finding that the sensitivity of spending to revenue changes has been higher in markets experiencing a more intense boom.

Finally, we performed some additional analyses in order to rule out the possibility that our findings are due to credit constraints. Spanish local governments are subject to debt limitations, credit authorizations from higher tiers of government being denied if either the debt burden and/or the level of debt are too high with respect to current revenues. Furthermore, during the years 2001, 2002 and 2003, an additional regulation (the so-called ‘Law of Budget Stability’) forbade the use of credit to fund additional spending increases (current or capital), with new debt only being allowed in order to refinance old debt. Following the 2004 national elections, the new left-wing government abolished this rule. Our results by year (as discussed above) do not indicate that this new law had any effect, since the degree of spending sensitivity to revenue changes actually fell in 2001, and while it did increase in 2002 and 2003, this formed part of a more substantial increase recorded in the years to come, once the regulation was no longer in force. Other authors similarly conclude that this law was not effectively enforced, at least outside the largest cities (see Solé-Ollé and Sorribas-Navarro, 2012). However, what this analysis cannot rule out is the general effect of the more basic regulations governing spending sensitivity to changes in revenue. To analyze this possibility, we follow Borge and Tovmo (2008) and divide the sample of municipalities into (i) those with high and low per capita revenues, (ii) those with high and low operating surplus as a percentage of current revenues, and (iii) those with high and low debt burden as a percentage of revenues. If credit constraints apply, spending sensitivity should be higher in municipalities with low revenues, and/or low operating surplus, and/or low debt burden than in the rest of the municipalities. Yet, in most cases we find that there are no differences between the two groups, and in some we actually find just that the differences go in direction opposite to what we expected. We can conclude, therefore, that Spanish municipalities were not under any credit constraints during this period. We consider this result to be reasonable, given the wide availability of credit in Spain during this period.

6. Conclusions

We have examined the budgetary behavior of Spanish local governments during the last housing boom (1997-2006), a period characterized by rapid growth in housing construction revenues. We have argued that this revenue growth might account for the increase in the sensitivity of local government spending to (predictable) revenue changes. We have estimated the degree of sensitivity of local spending to (predictable) changes in revenues, following the method adopted by Holtz-Eakin *et al*. (1994). The main findings of the paper are: (i) Local spending shows considerable sensitivity to predictable changes in revenues, suggesting that Spanish local governments did not behave as fully forward-looking agents. (ii) Their departure from this benchmark increased as the last housing boom intensified. Indeed, we have found evidence that spending sensitivity to revenue changes was greater a) after 2001 (when the upward trends in housing construction and housing prices was at their steepest) and b) in housing markets in which *Current revenues* and *Housing prices* grew most. (iii) This spending sensitivity was not as great in housing construction revenues as it was in ordinary revenues, but the difference was reduced as the boom intensified. Our results, therefore, seem to confirm some of the pessimistic predictions made by both Spanish scholars and the press about the effects of the housing boom on the budgets of local governments. While the claim that housing-construction revenues are always especially 'tempting' would appear to be unfounded, we have found that, in some cases (during the last few years of the boom and in *Coastal and Urban* housing markets which experienced high rates of price appreciation), these revenues are at least as 'equally tempting' as those derived from *Ordinary revenues* (i.e., *Ordinary taxes* and *Current grants*). However, there is one key difference between these revenue sources: while *Ordinary revenues* have not undergone any substantial drop as a result of the recession, *Housing construction revenues* have as good as vanished, leaving a hole in the revenue budget that has forced municipal governments to make extremely hard choices in an attempt to adjust their budgets to the new situation. Further analysis is required to determine just how the adjustment is being carried out.

The only comfort to be drawn from our results is that the largest component making up the revenue bubble generated by the housing boom, namely the revenues derived from *Sales of land plots,* did not have any impact whatsoever on current spending, as it was confined entirely within the capital budget. This does not mean, however, that all this revenue was used to reduce municipal debt; rather a considerable proportion was used to fund capital investments. This is assumed not to be entirely negative, since investment can be readily adjusted in times of recession. And yet, there is some evidence that investment projects can create hidden burdens for municipalities, in terms of the higher maintenance costs they incur and the higher level of current spending required to run the facilities. The idea has also been forwarded that investment can improve local amenities and, thus, foster future growth. However, little is known about the quality of the investment projects undertaken during revenue booms and it is conceivable that their selection may be less rigorous.

Finally, although we believe that the paper provides evidence to indicate that the housing revenue boom did result in a certain relaxation of local government spending controls, we are unable to state whether this was attributable to political economic forces or to the 'bubble psychology'. Future studies will be required to disentangle these effects.

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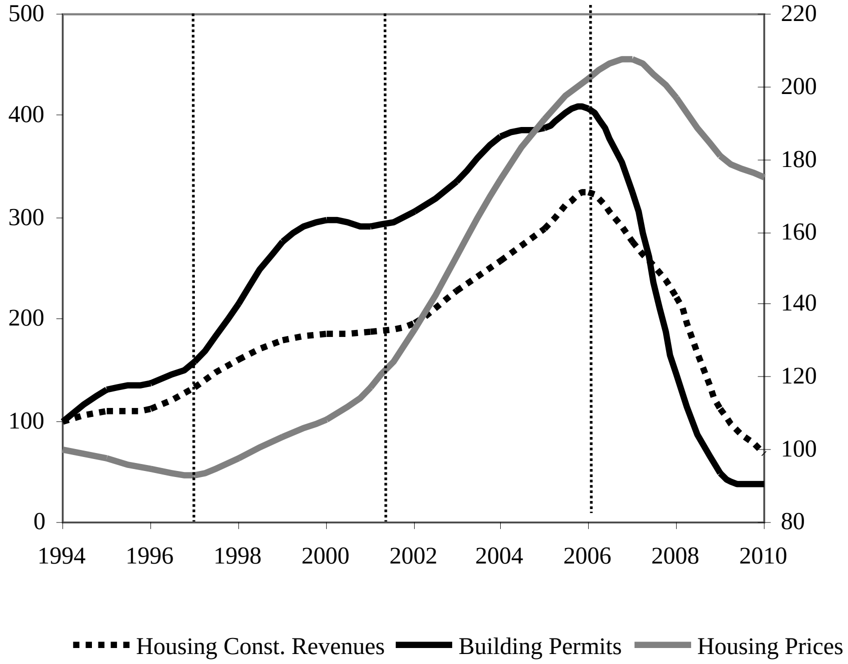
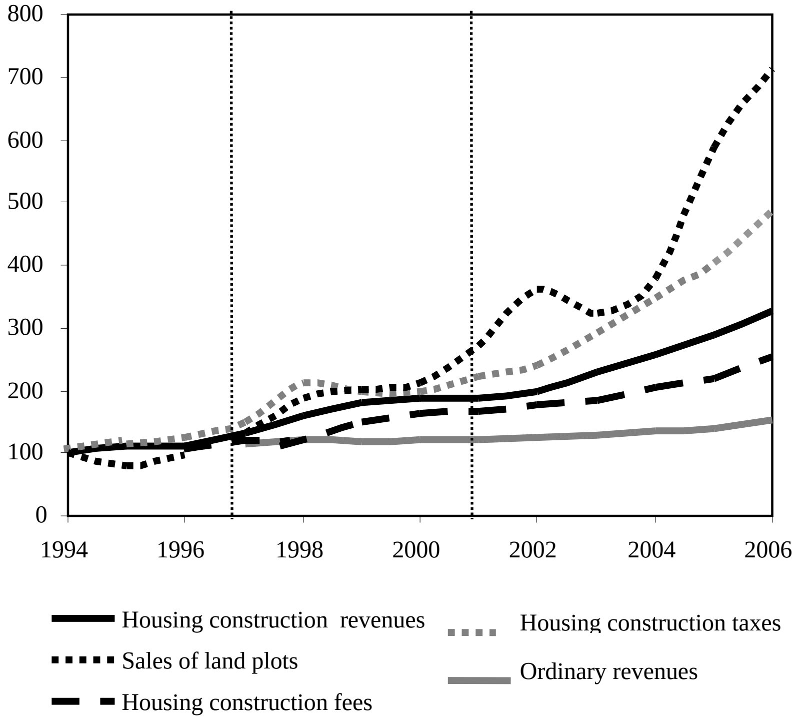
Figure 1:
Housing construction revenues vs Building permits and Housing prices. Spain, 1994-2010. *Year* 1994=100.



Notes: (1) Housing construction revenues expressed in real terms (See Table A.1 for a definition). (2) Building permits = 'viviendas iniciadas'. (3) Housing prices = price/m^2 of new houses, in real terms. (4) Housing construction revenues and building permits are plotted on the left axis, housing prices on the right.
Source: Ministerio de Fomento (www.fomento.es) and Ministerio de Economía y Hacienda (www.minhac.es).

Figure 2:
Breakdown of housing construction revenues.

Spain, 1994-2006. *Year* 1994=100



Notes: (1) See Table A.1 for the definitions of each item. (2) Data on the breakdown of housing construction revenues only available for the period 1994-2006

Source: Ministerio de Economía y Hacienda (www. Minhac .es).

Table 1:
Share of housing construction revenues over non-financial municipal revenues, 1994 *and* 2006 (*in %*)

	1994	2006
Ordinary revenues	80.82	70.37
Ordinary taxes and fees	46.82	40.05
Transfers (*current*)	33.98	30.32
Extraordinary revenues	19.18	28.94
Housing construction revenues	**11.76**	**21.27**
Housing construction taxes	5.39	9.05
Housing construction fees	4.15	5.62
Sales of land plots	2.22	6.60
Transfers (*capital*)	7.42	7.67
	100.00	100.00

Notes: (1) See Table A.1 for definitions and data sources; (2) Outlay data.
Source: Ministerio de Economía y Hacienda (www.minhac.es), *Base de datos de liquidaciones de los presupuestos de las Entidades Locales.*

Table 2:
Forward-looking behavior in local budgeting. Basic results.
Dependent variable: Growth in current spending, ΔC_t

	OLS		GMM	
	(i)	(ii)	(iii)	(iv)
ΔCurrent revenues: ΔR_t	0.273*** (19.95)	0.272*** (19.90)	0.638*** (4.88)	0.606*** (4.98)
R^2	0.128	0.131	--.--	--.--
F-stat./ Wald (all variables)	55.44 [0.000]	51.67 [0.000]	75.20 [0.000]	74.33 [0.000]
Arellano-Bond AR(1) *test*	--.--	--.--	-5.99 [0.000]	-7.04 [0.000]
Arellano-Bond AR(2) *test*	--.--	--.--	1.32 [0.230]	1.23 [0.221]
Hansen's J. *stat.* (*over-identification*)	--.--	--.--	12.53 [0.325]	12.61 [0.311]
Year fixed effects	YES	YES	YES	YES
Control variables	NO	YES	NO	YES

Notes: (1) Sample: 1,256 Spanish municipalities 1994 to 2006 (nº of obs. = 8,682). (2) Unbalanced panel: average number of observations per municipality is 7, the maximum being 10 (the full period covers 13 years, i.e. 1994-2006, but 3 years are lost because of instrument selection in the GMM estimation; OLS uses the same sample as that used in GMM. (3) t-statistics in parenthesis; p-values in brackets; ***, ** & * = statistically significant at the 99, 95 and 90% levels. (4) Robust standard errors. (5) Control variables include: % *younger than* 18, % *older than* 65, % *unemployed*, % *educated*, log(*population*) and Δlog(*population*), see Table 2 for the definition and sources of the variables. (6) *F-stat./Wald* (*all variables*) =OLS and GMM tests of joint statistical significance of all variables; (7) Excluded instruments lags t-2 to t-6 of the differences in spending and revenues (i.e. ΔC and ΔR) and savings, (R-C), lagged t-2. (8) AR(1) and AR(2): Arellano and Bond tests of residual auto-correlation. (9) *Hansen's J* over-identification statistic, distributed as a $\chi 2(n)$, with n= number of over-identifying constraints.

Table 3:
Forward-looking behavior and housing boom intensity.
Dependent variable: Growth in current spending, ΔC_t. GMM *estimation*

	(a) *By sub-period*		(b) *By revenue growth*		(c) *By type of market*	
	1997-2001	2002-2006	*Low*	*High*	*Other*	*Coastal & Urban*
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ*Current revenues*: ΔR_t	0.600*** (3.46)	0.863*** (4.81)	0.488*** (2.58)	0.831*** (3.71)	0.465*** (2.67)	0.844*** (5.35)
F-stat./ *Wald* (*all variables*)	14.22 [0.007]	30.49 [0.007]	56.45 [0.007]	113.89 [0.000]	75.27 [0.007]	60.54 [0.000]
Arellano-Bond AR(1) *test*	-4.55 [0.000]	-3.16 [0.000]	-5.60 [0.000]	-3.95 [0.000]	-7.78 [0.000]	-7.84 [0.000]
Arellano-Bond AR(2) *test*	0.57 [0.556]	0.27 [0.786]	1.11 [0.267]	1.33 [0.184]	1.18 [0.238]	0.72 [0.469]
Hansen's J. *stat*. (*over-identification*)	15.23 [0.272]	17.28 [0.368]	13.22 [0.263]	10.69 [0.297]	15.26 [0.361]	15.32 [0.221]
Year fixed effects	YES	YES	YES	YES	YES	YES
Control variables	YES	YES	YES	YES	YES	YES

Notes: (1) Period 1994-2001: 1,024 municipalities and 4,139 obs.; Period 2002-2006: 1,256 municipalities and 4,543 obs. (2) High (Low) means above (below) the median value of the *Revenue Growth* variable for the full period. (3) The *Coastal & Urban* subsample includes 879 municipalities and the *Other* subsample 355. (4) See Tables 2 and 3.

Table 4:
Forward-looking behavior and housing construction revenues.
Dependent variable: Growth in current spending, ΔC_t. GMM *estimation*

	(a) *Ordinary vs Housing const. revenues* (i)	(ii)	(b) *Housing const. revenues in the capital* (iv)	(v)
Δ *Ordinary revenues*: ΔO_t	0.748*** (4.75)	--.--	--.--	--.--
Δ *Current grant revenues*: ΔCG_t	--.--	0.868*** (3.53)	0.837*** (3.85)	0.835*** (4.16)
Δ *Tax revenues*: ΔT_t	--.--	0.713*** (3.50)	0.738*** (3.78)	0.741*** (3.87)
Δ *Housing construction revenues*: ΔH_t	0.156*** (2.64)	0.143*** (2.37)	0.136* (1.64)	0.137* (1.78)
Δ *Capital revenues*: ΔK_t	--.--	--.--	-0.054 (-0.75)	--.--
Δ *Capital Housing cons. revenues*: ΔKH_t	--.--	--.--	--.--	-0.038 (-0.53)
Δ *Capital grant revenues*: ΔKG_t	--.--	--.--	--.--	-0.102 (-1.21)
Wald (*all variables*)	104.75 [0.000]	203.07 [0.000]	215.57 [0.000]	204.31 [0.000]
Arellano-Bond AR(1) *test*	-1.70 [0.088]	-1.79 [0.073]	-1.70 [0.090]	-1.66 [0.098]
Arellano-Bond AR(2) *test*	1.23 [0.221]	1.52 [0.128]	1.15 [0.248]	1.43 [0.260]
Hansen's J. *stat*. (*over-identification*)	21.71 [0.447]	20.24 [0.506]	26.75 [0.423]	30.47 [0.493]
Year fixed effects	YES	YES	YES	YES
Control variables	YES	YES	YES	YES

Notes: (1) Excluded instruments lags t-2 to t-6 of the differences in spending and the revenue categories considered in each equation (e.g. in column i these are: lags t-2 to t-6 of Δ*C*, Δ*O* and Δ*H* and the savings to revenues ratio, (*R*-*C*), lagged t-2. (2) See Table 3. (3) See Table A.1 for definitions of the budget variables.

Table 5:
Forward-looking behavior, housing construction revenues, and housing boom intensity
Dependent variable: Growth in current spending, ΔC_t. GMM *estimation*

	(a) *By sub-period*		(b) *By revenue growth*		(c) *By type of market*	
	1997-2001	2002-2006	*Low*	*High*	*Other*	*Coastal & Urban*
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Δ *Ordinary revenues*: ΔO_t	0.686*** (4.88)	0.853*** (6.94)	0.623*** (3.01)	0.883*** (3.48)	0.638*** (2.78)	0.881*** (4.56)
Δ *Housing construction revenues*: ΔH_t	0.113*** (3.70)	0.493*** (3.01)	0.155** (2.41)	0.700** (2.17)	0.168** (2.72)	0.772*** (2.74)
Wald (*all variables*)	237.84 [0.000]	89.38 [0.000]	42.03 [0.000]	124.74 [0.000]	80.33 [0.000]	78.06 [0.000]
Arellano-Bond AR(1) *test*	-5.76 [0.000]	-1.47 [0.142]	-5.33 [0.000]	-4.13 [0.000]	-4.66 [0.000]	-7.91 [0.000]
Arellano-Bond AR(2) *test*	1.26 [0.189]	1.25 [0.188]	0.71 [0.479]	1.47 [0.142]	0.73 [0.466]	1.51 [0.13]
Hansen's J. *stat.* (*over-identification*)	17.25 [0.365]	24.95 [0.353]	21.45 [0.257]	14.775 [0.376]	14.04 [0.371]	22.76 [0.272]
Year fixed effects	YES	YES	YES	YES	YES	YES
Control variables	YES	YES	YES	YES	YES	YES

Notes: (1) See Tables 2 and 3

Table A.1:
Definitions and data sources

	Definitions
Panel (a): *Budget data* (Source: Ministerio de Economía y Hacienda , "Base de datos de liquidaciones de los presupuestos de las Entidades Locales")	
Δ *Current spending*: ΔC_t	Yearly increase in current spending / lagged current revenues Current spending = Spending on personnel (chapter I)+ Spending on purchases (chapter II) + Spending on transfers (chapter IV)
Δ *Current revenues*: ΔO_t	Yearly increase in current revenues / lagged current revenues Current revenues = Ordinary revenues + Housing construction revenues
Δ *Ordinary revenues*: ΔO_t	Yearly increase in ordinary revenues / lagged current revenues Ordinary revenues = Ordinary taxes + Current grants
Δ *Current grant revenues*: ΔCG_t	Yearly increase in current grants / lagged current revenues Current grants = Chapter IV of the budget
Δ *Tax revenues*: ΔT_t	Yearly increase in ordinary taxes and fees / lagged current revenues Ordinary taxes = chapters I & II of the budget – items 114 and 228 Ordinary fees = chapter III – items 3.1, 3.6 & 3.9
Δ *Housing construction revenues*: ΔH_t	Yearly increase in housing construction revenues / lagged current revenues Housing construction revenues (excluding those in the capital account)= Housing construction taxes + Housing construction fees + Developers' fees Housing construction taxes = Construction Tax, item 114, and Land value increase tax, item 228) Housing construction fees = Impact fees (item 3.6) Developers' fees (items 3.1 & 3.9)
Δ *Capital revenues*: ΔK_t	Yearly increase in capital revenues / lagged current revenues Capital revenues = Sales of land plots + capital grants
Δ *Capital Housing cons. revenues*: ΔKH_t	Yearly increase in sales of land plots / lagged current revenues Sales of land plots = item 6.1
Δ *Capital grant revenues*: ΔKG_t	Yearly increase in capital revenues / lagged current revenues Capital revenues = chapter VII
Panel (b): *Socio-economic data* (Sources: Instituto Nacional de Estadística, INE, www.ine.es and Instituto Nacional de Empleo, INEM, www.inem.es)	
% *younger than* 18	% of the population less than 18 years old
% *older than* 65	% of the population more than 65 years old
% *unemployed*	% of the population unemployed ('paro registrado'/'población de derecho')
% *educated*	% of the population with higher education
log(*population*)	Resident population ('población de derecho')
log(*land area*)	Land area under the jurisdiction of the municipality in Km^2

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