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ARTICLE

A comparison of banks and real estate intermediaries as house sellers

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Abstract
The foreclosure crisis associated with the banking crisis transformed banks in the hardest-hit countries into real estate brokers. The main novelty of this paper is to study banks as sellers of their own foreclosed properties and compare banks' sales outcomes with those of traditional agents in the real estate market. We compare the list price, selling price, time on market and price discount of traditional real estate companies (TRECs) and bank-owned real estate companies (BRECs). We find evidence of a higher selling price, higher list price and longer time on market (TOM) for BRECs than for TRECs. Our findings are consistent with BRECs displaying greater patience as well as lower risk aversion. However, these explanations are not enough to fully account for the magnitudes of the coefficients. The empirical estimates suggest that information in the housing market may also be a source of distortions. In fact, the main aim of the sale varies depending on the incentives of the company. BREC sellers are banks that own the properties for sale, so their incentives are to maximize selling prices to reduce the loss charged to their annual results, while TRECs seek to minimize the TOM.

Keywords Real estate companies · Banks · Time on market · Selling price · List price

1 Introduction

Real estate assets are heterogeneous, displaying a greater variety of attributes than most other goods. Consequently, obtaining and conveying credible information about a property's characteristics are crucial for the success of a real estate transaction. Real estate brokers may benefit buyers by providing information about properties and neighbourhoods in areas where the buyer may have little familiarity, providing advertising services, setting more accurate property list prices and enhancing the value of properties by improving their presentation. An additional benefit is that brokers may help market participants obtain and convey accurate and credible information. In summary, brokers offer sellers

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potentially useful knowledge and expertise (as well as convenience by showing and advertising the house and helping with paperwork). However, because the relationship between the homeowner and the broker resembles a classical principal-agent problem, brokers may not deploy their services in ways that promote sellers' interests (Bernheim & Meer, 2008). Brokers have strong incentives to sell houses quickly, even at a substantial price reduction (Levitt & Syverson, 2008).

The economic literature has extensively analysed the impact of real estate brokers on the outcomes of housing sales. The consensus seems to be that, on average, the use of a real estate broker tends to decrease the number of days that a property remains on the market (Baryla & Ztanpano, 1995; Bernheim & Meer, 2008; Elder et al., 1999; Hendel et al., 2009; Levitt & Syverson, 2008; Rutherford et al., 2005). With respect to price, some authors (Benjamin & Chinloy, 2000; Bernheim & Meer, 2008; Elder et al., 2000; Hendel et al., 2009) find that real estate brokers have no impact on transaction prices. On the other hand, Yavas and Yang (1995) and Violand and Simon (2007) find that brokers affect transaction prices for certain combinations of house characteristics but not for others. Agarwal et al., (2019) shows that agents use information advantages and bought their own houses at prices that are 2.54% lower than those of comparable houses bought by other buyers. Hayunga and Munneke, (2019) also demonstrate that agents (and investors) hold bargaining power relative to individuals in their purchases. Rutherford et al. (2005) and Levitt and Syverson (2008) find that brokers obtain a higher price for their own properties (2.6–7%), but to do so, they must leave the properties on the market longer. Bernheim and Meer (2013) also present evidence that houses on the Stanford University campus sold directly by the owner fetch a higher price. Gautier et al. (2017) show that flat-fee agents sell properties more rapidly, and the average price is 2.7% higher than that secured by traditional agents. Therefore, the profits of traditional brokers are at least partly driven by rents rather than performance. Finally, Hendel et al. (2009) compare the outcomes of sellers who list their home on a for-sale-by-owner (FSBO) website versus those who used an agent and a multiple listing service (MLS). MLS shortens the time to sale, but the two servicers deliver the same price.

Thus, real estate markets provide a particularly fertile testing ground for examining the impact of brokers and their information on transaction outcomes. The main novelties of this paper are the study of banks as sellers of their own foreclosed properties and the comparison with other traditional agents in the real estate market. The paper extends the previous literature to analyse a new type of real estate broker that appeared in countries strongly affected by the 2008 financial crisis. The foreclosure crisis associated with the banking crisis has transformed the banks of the hardest-hit countries into real estate brokers. Spain is a clear example of banks adding intermediation in the real estate market to their traditional activities. The very lax mortgage standards of Spanish banks during the expansion of 2001–2007 led to excessive exposure to real estate assets. Following the collapse of the country's property market in 2008, Spanish banks foreclosed many properties. To clean up their balance sheets of property assets, banks created real estate brokers such as Altimira (Santander Bank), Solvia (Banco Sabadell), Bankimia (BBVA) and CXI (Catalunya Caixa), among many others. Thus, from 2009, banks and traditional real estate brokers started competing in the housing market. In this paper, we compare the outcomes (list price, selling price, time on market and price cut) of traditional real estate companies (TRECs) and real estate brokers belonging to banks (BRECs). Both companies competed in the same housing market. We found evidence of a higher selling price, higher list price and longer time on market (TOM) for BRECs than for TRECs. Our findings are consistent with the greater patience as well as lower risk aversion of BRECs. However, these explanations are

not enough to fully account for the magnitudes of the coefficients. The empirical estimates suggest that information in the housing market can also be a source of distortions. In fact, the main aim of the sale varies depending on the incentives of the company. BREC sellers are banks that own dwellings, so their incentive is to maximize selling prices to reduce the loss charged to the annual results, while TRECs aim to minimize the TOM. Additionally, we present evidence for possible explanations from behavioural economics. In particular, higher list prices observed for BRECs than for TRECs are consistent with results from behavioural economics (Kahneman et al., 1986a, 1986b; Thaler, 2015). BRECs prefer to set a high list price rather than to reduce list prices. This strategy produces a feeling of fairness in the buyer, who, unaware of the reference price, believes she has obtained a good deal. Hence, this strategy allows BRECs to maintain the loyalty of future customers while maximizing profit (which is consistent with the main incentive of BRECs). Additionally, this strategic behaviour is consistent with the anchor effect and prospect theory.

The remainder of the paper is structured as follows. We start by contextualizing the housing market and housing finance in Spain, explaining the role of BRECs in this market. In Sect. 3, we outline our theoretical framework and the hypotheses to test. Section 4 describes our dataset. In this section, we show differences in means for TRECs and BRECs in terms of not only housing characteristics but also outcomes (selling price, list price, price cut and TOM). Then, we present the empirical estimates. The subsequent section describes possible explanations of the results obtained. Finally, we end by summarizing the arguments and presenting some concluding remarks.

2 Spanish credit and housing bubble

In the years prior to the great financial crisis, Spain experienced one of the most important housing booms among developed economies. This housing boom was one of the main engines of economic growth in Spain. During this period, more dwellings were built in Spain than in Germany, the U.K., France and Italy combined. According to official statistics from the Department of Public Works, housing reached 860,000 dwellings in 2006. The average number of originated mortgages was more than 1.1 million per year. These figures are quite remarkable if we consider that the number of households in Spain during that period was 15.5 million. Greater competitive pressure implied that managers of financial institutions could only increase profits drastically by originating a large number of new mortgages. Excessive dependence on the real estate industry, together with a softening of the credit standards (Akin et al., 2014), explains why the economic and financial crisis hit Spain harder than other developed economies. Consequently, 61.495 million € was needed to rescue the country's financial system.

During this crisis, one of the main problems facing financial institutions was that their balance sheets held not only risky mortgages but also properties at inflated prices (Akin et al., 2014). The majority of BRECs' housing stock came from foreclosures (in the case of properties from families) or bankruptcy (in the case of properties from building companies).

Figure 1 shows the evolution of the gross value of foreclosed real estate assets owned by Spanish banks. From 2009 to the second half of 2011, the gross value increased. The reduction in 2012 and 2013 was due to the transfer to SAREB (the bad bank of the Spanish government) of the real estate assets owned by financial institutions that were rescued by the public sector.

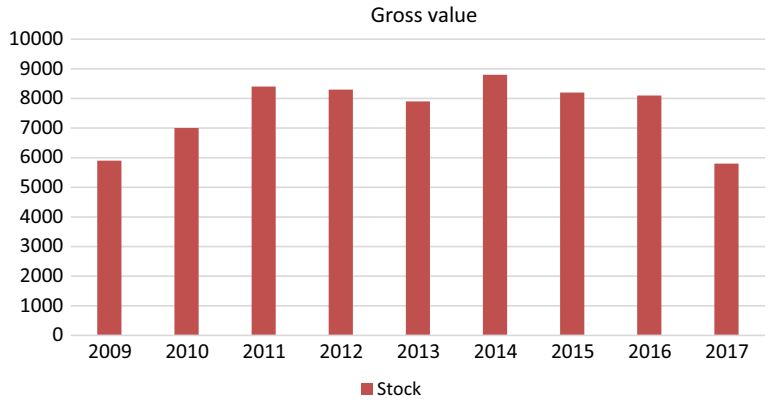


Fig. 1 Gross value (million euro) of foreclosed real estate properties owned by Spanish banks

To illustrate, using the value of property assets of 80,000 million (the average for the whole period), we estimate that the number of dwellings on the balance sheets of financial institutions at the end of 2013 was 245,000 units. This figure represents 28.8% of the inventory of unsold new housing.

In this scenario, financial institutions began to operate as real estate broker companies (bank real estate companies or BRECs) and compete with traditional real estate companies (traditional real estate companies or TRECs) to sell their housing stock. Those new companies were responsible for a large proportion of housing transactions. Our calculations indicate that the real estate units sold by banks or bank-owned corporations amount to approximately 23% of all transactions in the Spanish real estate market.

3 Theoretical framework

Levitt and Syverson (2008) found that agent-owned homes are sold for more and remain on the market longer than clients' homes. They show that this result cannot be sufficiently explained within competitive markets without either informational frictions or agency problems. Competitive market explanations include unobserved differences between homes, greater patience and less risk aversion. In this sense, agent distortions through either eluding effort or exploiting an informational advantage are proposed to explain the results. Of the two explanations, Levitt and Syverson (2008) lean towards informational asymmetries.

We can compare the behaviour of TRECs and BRECs using a similar approach to that used by Levitt and Syverson (2008) and Hendel et al. (2009). Traditional real estate agents receive only a small share of the incremental profit when a house sells for a higher value. However, BRECs obtain 100% of the incremental profit of the sale, so they have an incentive to maximize price, while TRECs have an incentive to sell the house quickly. In our case, we observe a lower selling price and TOM for TRECs than for BRECs. The higher risk aversion of TREC agents and the greater patience of BRECs can also explain these results. There is no evidence of a larger shirking of effort by TRECs with respect to BRECs.

Using the previous arguments, we can define two hypotheses:

Claim 1 *For a given dwelling, we should observe a shorter time to sale in TRECs.*

As mentioned, overall, the economic literature (Baryla & Zumpano, 1995; Elder et al., 1999; Rutherford et al., 2005; Bernheim & Meer, 2008; Levitt & Syverson, 2008; Hendel et al., 2009) concludes that TRECs have an incentive to shorten the TOM. Agency problems (Levitt & Syverson, 2008) are therefore the source of this claim. BRECs' greater patience, given that selling homes is not their core business, and lower risk aversion, given their portfolios are more diversified than those of TRECs, reinforce this claim. As Hendel et al. (2009) point out, a patient seller obtains a higher price. However, changes in capital requirements and provisions (funds to cover eventual future obligations) on foreclosure properties may affect BRECs' incentives to wait for a high transaction price. A BREC's decision on when to sell a property must consider that keeping real estate assets on its balance sheet produces several costs not borne by traditional real estate intermediaries. In particular, there is a time-dependent provision that decreases the net value of such properties with a charge to bank profits. This charge is a proportion of the accounting value of the real estate property. The alternative choice is to sell the property at the market price, which implies charging the loss against profits. Assuming that the price at which the bank secure property ownership is the same as the market price at that time, then the bank chooses to sell when the market price is higher than the value of the property on its balance sheet after the provision:

$$(1-g)^n > (1-dn)$$

where n is the number of time periods, g is the rate of price reduction of residential properties and d is the annual rate of the provision. This relationship implies that as long as $g > 1 - \exp\left[\frac{\ln(1-dn)}{n}\right]$, banks find it more profitable to wait instead of selling at time n. Figure 1 shows the relationship between d and g for several values of n when both sides of the equation are equal (Fig. 2).

During the period of analysis, the Spanish banking regulation imposed a 10% yearly charge on the original value of properties repossessed by banks that were included on their balance sheets. The schedule of provisions increased only during the first three years; afterwards, the value was set to 70% of the initial property value. Therefore, the optimal n to sell the property increased quite rapidly when the expected reduction in prices increased above 10%. This schedule of provisions was quite different from the situation in the US. Soon after the beginning of the crisis, US banks started offering discounts on foreclosed properties. This situation was not the case in the Spanish banking system because it was more convenient, in terms of profit and loss (P&L), to pay the provision than to sell at a large discount, and banks expected housing prices to recover soon. It was not until 2015–2018 that banks decided to sell their stock of foreclosed properties to investment funds and hedge funds.

Claim 2 *For a given dwelling, we should observe higher selling prices among BRECs. The literature on incentives would predict such price differences between BRECs and TRECs.*

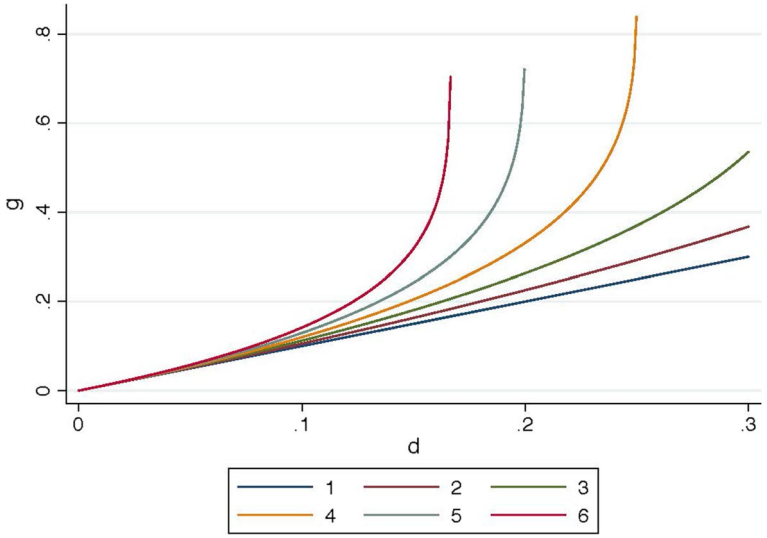


Fig. 2 Relationship between d and g a particular number of periods

The literature on search and bargaining points out that sellers have the ability to set high asking prices and obtain high selling prices if they are willing to be patient and bargain hard (Genesove & Mayer, 2001; Yavas & Yang, 1995). The effect on price discounts is difficult to predict. Thus, agent-based theory predicts that a higher selling price (for a particular BREC in our case) can be obtained either by raising the list price and setting the price discount at an amount equivalent to (or slightly higher than) the increase or by setting the same list price TO that of a TREC and offering a smaller price discount after negotiation. In this case, we use the framework of behavioural economics (Kahneman et al., 1986a, 1986b; Thaler, 2015) to interpret the results. Goods that are bought infrequently and whose quality is difficult to assess are usually marketed by sellers as a "good deal". Sellers have an incentive to manipulate the perceived reference price and create the illusion of a "good deal". Homes fulfil both characteristics, so they can be marketed in this way.

We have explained why BRECs are more prone to using this strategy than TRECs and other loss-averse agents. However, both BRECs and TRECs can use it. That said, the strategy has limitations. For example, a very high list price relative to observable characteristics (known in the literature as a higher degree of overpricing) discourages buyers from further investigating the property (Guren, 2018; Ngai & Sheedy, 2013). However, BRECs remain more likely to use this marketing strategy because, first, (linking again with incentive theory) the basic objective of BRECs is profit, while TRECs prioritize the TOM, and second, a "good deal" gives the buyer an impression of fairness, which is more important for BRECs than for TRECs. Buyers seem to appreciate a BREC's effort to be "fair". Keeping customers happy by seeming fair is an especially high priority for companies that plan to sell to the same customers for a long time. Since banks may provide the mortgage to finance the property and use it as a cross-selling product, the probability of doing future business with the buyer is higher for BRECs than for TRECs. Therefore, it is important for banks to give customers and the public the impression that their transactions are fair (especially given that banks were the basic culprit behind the financial crisis and their morality was heavily questioned). In this sense, banks have more to lose if buyers feel that they

act unfairly. After all, since selling properties is not the core business of BRECs, higher (lower) selling prices can be compensated by cheaper (more expensive) loans to buyers to adjust their balance sheets.

We should factor in an additional element. BRECs use appraisal values as a guide to set their list prices. However, it is now well known that houses displayed a high level of over-appraisal in Spain during the real state expansion (Akin et al., 2014). This phenomenon implies that banks should set high list prices. This expectation is consistent with another theoretical explanation from behavioural economics: the anchor effect (the appraisal price is the reference price for BRECs). Finally, prospect theory (Kahneman & Tversky, 1979) also predicts a higher list price. According to this theory, loss-averse agents consider the original purchase as a reference point. Based on mental accounting and the associated need to break even, sellers can set a higher list price, especially in bust periods.

In line with the previous arguments, we can develop two new hypotheses:

Claim 3 *For a given dwelling, we should observe higher list prices among BRECs than among TRECs.*

Claim 4 *For a given dwelling and list price, the discount offered by BRECs will be either equal to or higher than that offered by TRECs. If BRECs' price discount is higher, it will not be enough to compensate for their higher list price compared to that of TRECs.*

4 Data

We use two datasets. On the one hand, we use a dataset obtained from a housing market intermediary with franchisers in most Spanish provinces. This real estate company also possesses its own mortgage brokerage branch. For instance, this company accounted for 4% of total real estate sales in Spain during 2012 This percentage is the highest market share of any intermediary operating in the Spanish residential real estate market since most transactions in this market still involve a direct negotiation between the homeowner and the buyer. Our data were not collected with the objective of being representative of the entire population of houses sold during the sample period. The intermediaries that provided information are not uniformly represented in Spain (there are more branches in large cities and metropolitan areas around large cities), which does not seem to affect the mean prices. The table below shows a comparison of the appraisal prices of our dataset with those obtained from the Department of Public Works (DPW) for cities where the firm has a very large sample. The comparison corresponds to the second semester of 2012. Appraisal prices are the only variable that we can compare with a population variable (in fact, the data of the DPW are not the population of appraisals, but they are quite close). The table shows a very small deviation in appraisal prices between our sample and the population (or close to the population) of appraisals that compile the DPW. The difference is only 3.2% for the average of these cities. Therefore, and given that we are not claiming that our sample is fully representative of the population of all transacted properties of the years under study, we believe there are no reason to expect that the differences would be much larger in places not included in the table (except for sampling variability) (Table 1).

On the other hand, we use a dataset from a real estate company belonging to a bank holding 3.4% of the total housing stock held by financial institutions. In fact, this figure

Table 1 Price level comparison of housing data from the DPW and sample data

	Price level comparison	
	Appraisal price	
	Sample	Department of public works
	€/m^2	€/m^2
Barcelona	2569	3103
L'Hospitalet de Llobregat	1949	1647
Madrid	2326	2459
Málaga	1404	1416
Sevilla	1643	1715
Valencia	1187	1317
Zaragoza	1626	1517
Total	**2072**	**2141**

Bold values indicates the total numbers for all the categories

Table 2 % Of Housing Stock and mean price of BRECs in 2013

BREC	% of housing stock	Mean price of housing stock
1	6.53	133.333
2	19.89	68.699
3	19.47	136.027
4	10.92	168.64
5	6.41	88.889
6	18.58	180.462
7	**3.40**	**125.563**
8	1.18	136.549
9	2.00	125.941
10	3.86	145.516
11	2.89	125.941
12	3.02	125.941
13	1.85	84.045
Total	**16.93**	**129.511**

Bold values indicates the total numbers for all the categories

is calculated after transferring some of the properties to the SAREB. The SAREB is what is colloquially called a 'bad bank' or a special purpose entity backed by the Spanish government to manage and disinvest foreclosure properties and delinquent mortgages that were transferred to it from the four nationalized Spanish financial institutions. Our data belong to one of these financial institutions. The data represent the situation prior to the transfer to the SAREB. At that time, the company was holding more than 9% of the total housing stock held by financial institutions. As in TRECs, although not uniformly represented in Spain, the mean values of turnover and net value are similar to those of all properties held by BRECs. To show this fact, we built Table 2 using information from the financial reports of financial institutions. Our institution is BREC

Table 3 Mean comparison of housing characteristics by type of real estate company

Characteristic	TREC		BREC			
	Mean	Std. dev	Mean	Std. dev	Difference	t-stat
Explanatory variables						
Surface	68.00	20.17	72.36	29.26	−4.36	−6.16**
Number of rooms	2.84	0.99	2.45	0.80	0.39	14.15**
Number of bathrooms	1.51	0.68	1.48	0.64	0.03	1.69*
Lift	0.63	0.50	0.58	0.49	0.05	2.58**
Outcomes						
List price	135		192		−49	−20.90**
Selling to list price	0.88		0.86		−57	−22.96**
TOM	101		139		0.02	4.61**
List price	135		192		−38	−14.86**
Observations	6562		951			

***p < 0.01, **p < 0.05, *p < 0.1

7, and the mean price is very close to the mean price of all housing stock of BRECs in Spain. The data cover the period from 26/01/2010 to 07/03/2013. We consider only properties that are actually on the market since it takes time for banks to complete the process of actual repossession until the property is ready to be marketed and sold.

Adding data from the two databases, we have 7,513 dwellings sold: 951 provided by the bank-dependent real estate company and 6,562 provided by the traditional real estate company. For the whole sample, we have information on housing characteristics (size, rooms, bathrooms, availability of a lift) and the transaction (list price, selling price, time on market). In Table 3, we compare the properties sold by the traditional real estate company and the bank-owned real estate company. A key question is whether these properties are comparable. The first two columns present the mean and standard deviation. The last two columns present the differences in means and the t-statistics of the differences. The differences are small but, because of the reasonably large sample sizes, statistically significant. TREC properties generally have more room than BREC properties, and a higher proportion has a lift. These differences in the characteristics of the real estate properties sold by BRECs and TRECs require homogenization of their quality. The traditional method used to compare heterogeneous real estate properties is hedonic regression, which is the method we adopt.

We now explore the differences in outcomes. In Table 3, we also present the differences in means and t-statistics for the basic outcomes (selling price in thousands of euros, list price in thousands of euros, price discount and time on market) of properties sold through TRECs and BRECs. The results suggest that there is a large positive premium in the selling price (41.2%) for properties sold by BRECs. This premium is similar to that observed in list prices (42.2%). From this slightly higher premium in the list price than in the selling price, we can infer that brokers from BRECs use the marketing strategy of increasing the perceived reference price. A fair deal is prioritized by BRECs. In this respect, this upwards bias may also be explained by the use of the appraisal price as a guide to set list prices. Akin et al. (2014) observed higher upwards bias in the case of commercial banks and FROB-owned institutions.

Consequently, a slightly larger price discount (lower selling price to list price ratio) is also observed in properties sold by BRECs (14%) with respect to the price observed in properties sold by TRECs (12%). Similarly, the TOM for properties sold by BRECs is 38 days longer than that for properties sold by TRECs.

5 Method

The previous results seem to highlight that properties sold by BRECs have a higher TOM, list price, selling price and price discount. However, the numbers in Table 3 suggest some differences in the observed characteristics and locations of houses sold by TRECs and BRECs. If the houses sold by BRECs have more attractive characteristics, then the previous evidence also captures the impact of these features rather than the effect of company type. Additionally, TRECs and BRECs have a different market share in many areas of the country (in fact, BREC properties were located in areas with a high proportion of the housing stock).

To control for differences in houses, we construct a hedonic model of prices (for the selling and list price outcomes in logs). For this purpose, we add surface, number of rooms, number of bathrooms, and the availability of a lift as explanatory variables in the model (the characteristics of the house displayed in Table 1). Among the controls, we include the following: postal code (to control for location[1]), monthly time dummies, two dummy variables for properties sold in Barcelona or Madrid and the percentage of the total housing stock of the city to which the property belongs. The TOM is also a control (see footnote 2 for details after estimation of the baseline model). Controlling for location and time dummies permits us to estimate a fixed effects model with fixed effects of time and location. In doing so, we exploit within-group variation over time since we control for the average differences across postal codes and year (which is a very granular group) in any observable or unobservable predictors, such as differences in quality. The fixed effect coefficients soak up all the across-group actions. What remains is within-group action; that is, we have greatly reduced the threat of endogeneity in the form of omitted variable bias or any mechanism that works across groups. Additionally, we have clustered standard errors at the province level.

Finally, we add BREC: a dummy variable that takes a value of 1 if a property is sold by a BREC. In addition, we estimate a model in which the dependent variable is the ratio of selling price to list price and a model in which the dependent variable is the TOM. The controls follow a similar structure, except that in this latter case, the TOM is replaced by the ratio of selling price to list price as the control variable. Additionally, we compute the degree of overpricing (DOP), as in Anglin et al. (2003). The DOP is measured as the percentage deviation from a typical list price given the observable characteristics of the house. Specifically, we compute a hedonic regression in which the dependent variable is the list price and use the residual to determine the degree of overpricing. The DOP is included as an explanatory variable in the TOM equation.

Therefore, the estimated equation is:

[1] A postal code is a very granular location control in Spain. For example, in Barcelona (101.9 km^2), there are 55 different postal codes (i.e., one postal code for every 1.85 km^2). Our data represents 534 different postal codes.

$$Y_{it} = \alpha + \beta X_{it} + \delta BREC_{it} + \gamma_t + \varphi_j + \varepsilon_{it} \quad (1)$$

where Y_{it} is the outcome estimated (selling price, list price selling to list price ratio or TOM), X_{it} is the vector of hedonic characteristics and other controls (dummies for Madrid and Barcelona, stock, TOM—except in the TOM equation—or DOP—in the TOM equation), γ_t is the time fixed effect, φ_j represents the location (postal codes) fixed effects and ε_{it} is the error term.

6 Results

The first column of Table 4 reports the results from the hedonic model in which the dependent variable is the selling price (in logs). We were able to explain 78% of the variation in the logarithm of price. Each additional square metre increases the selling price by 1.16%, while the impact of one additional room or bathroom is 4.09 and 5.52%, respectively. A lift increases the price by more than 23.8%. A location in one of the two major cities (Madrid or Barcelona) has a large positive premium (25.4% for Madrid and 29.3% for Barcelona).

BREC properties are sold at a higher premium (approximately 23%). This premium is smaller than that observed in the table of descriptive statistics. In column two, we explore the impact of these variables with respect to list price. The impact of the characteristics is nearly identical. The same occurs with the BREC variable. Once we control for characteristics and location, the premium on properties sold by BRECs observed in the list price is only one point higher than that observed in the selling price. Consequently, the coefficient of BREC is insignificant in the third column. The price discount is the same for properties sold by TRECs and BRECs. In the last column of Table 4, we observe a longer time to sale in the case of BRECs—specifically, 54 more days.[2]

In this sense, the possibility of selecting their own assets may explain the outcomes obtained for TRECs. The lower observed list price may result from initially underestimating the property value fixed with the purpose of selling the property quickly. The lower selling price follows the incentive of minimizing the TOM instead of maximizing the selling price since only a percentage of the amount at which the asset is sold is earned by the TREC. Thus, the differences in outcomes can be explained by different incentives. As shown by Levitt and Syverson (2008), the main aim for TRECs is to minimize the TOM. Because traditional real estate agents receive only a small share of the incremental profit when a house sells for a higher value, they have an incentive to convince their clients to sell their houses too cheaply and too quickly. A higher rotation seems to indicate that the objective is not to maximize the selling price. There may be an incentive for TRECs to accept properties whose owners do not seek an excessively high price and who have a certain degree of flexibility in lowering the list price, obtaining a shorter TOM as a result. BRECs have different incentives. These companies are more inattentive, and since they wait longer to sell, they can maximize the price

[2] In fact, the effect of BRECs on selling price is reflected in the TOM as the latter is an explanatory variable for price and SP/LP. We estimated the model without adding the effect of TOM on price. These effects are 23.3% (selling price), 28.4% (list price), 3.7% (SP/LP) and 67 days (TOM). Although slightly higher, the effects are similar. However, Yavas and Yang (1995) point out that the listing price affects the TOM and vice versa, resulting in a simultaneity problem between the selling price and the time on market. We follow Yavas and Yang (1995) and Ben-Shahar (2002) and simultaneously estimate the TOM and selling price using the degree of overpricing as the identification variable in the TOM equation. The effect of BRECs on the selling price is 20.6% and on TOM is 38 days.

Table 4 Estimated models of outcomes

Variables	(1) Selling price (log)	(2) List price (log)	(3) Selling to list price ratio	(4) TOM (days)
TOM (100 days)	−0.00601*	0.0743***	−0.0562***	
	(0.0043)	(0.0042)	(0.00149)	
Selling to list price ratio				−314.5***
				(8.226)
Degree of overpricing				−16.08***
				(3.277)
Number of bathrooms	0.0552***	0.0439***	0.00938***	6.211***
	(0.00575)	(0.00558)	(0.00198)	(1.433)
Number of rooms	0.0409***	0.0372***	0.00240	2.464**
	(0.00495)	(0.00481)	(0.00170)	(1.240)
Surface	0.0116***	0.0115***	0.000117	0.0563
	(0.000217)	(0.000211)	(7.48e−05)	(0.0550)
Lift	0.238***	0.223***	0.0112***	8.745***
	(0.00713)	(0.00692)	(0.00245)	(1.782)
% housing stock	−4.850	−1.658	−2.580**	−37,086
	(3.401)	(3.303)	(1.170)	(28,547)
Madrid	0.254**	0.215**	0.0300	−0.0937
	(0.101)	(0.0981)	(0.0348)	(26.59)
Barcelona	0.293***	0.301***	−0.0169	3.401
	(0.0696)	(0.0676)	(0.0239)	(20.88)
BREC	0.229***	0.235***	0.000358	53.79***
	(0.0310)	(0.0301)	(0.0107)	(7.71)
Constant	4.064***	4.013***	1.031***	384.0***
	(0.277)	(0.266)	(0.0925)	(70.72)
Control for postal code	Yes	Yes	Yes	Yes
Monthly time dummies	Yes	Yes	Yes	Yes
Observations	7513	7513	7513	7513
Adjusted R-squared	0.78	0.78	0.49	0.45

Standard errors in parentheses

***$p<0.01$, **$p<0.05$, *$p<0.1$

obtained. Additionally, real estate brokerage represents only a small part of BRECs' business activity. Overall, agent distortions and BRECs' greater patience and lower risk aversion can explain the results. The results also present evidence for the list price hypothesis based on behavioural economics. BRECs prefer the marketing strategy of setting a higher list price and then reducing this price to that of TRECs rather than setting a list price similar to that of TRECs and then being more reluctant to reduce the price. This strategy gives BRECs a social image of fairness in their transactions based on the possibility of buyers obtaining a "good deal". In fact, BRECs ran many advertising campaigns claiming large discounts (see some examples in Appendix 1). This behaviour may also reflect the fact that BRECs anchor their prices to the original appraisal prices. The initial appraisal values were high to begin with, and BRECs' losses are calculated as the difference between the selling price and the appraisal value.

Table 5 Effect of BRECs on outcomes, including interactions among the BREC dummy and hedonic characteristics

	Selling price	List price	Selling to list price ratio	TOM
BREC	0.5540***	0.4860***	0.0497**	54.1190*
BREC*bathrooms	0.0805***	0.0348	0.0295***	198.1913**
BREC*rooms	−0.0394**	−0.0152	−0.0181***	−3.1979
BREC*surface	−0.0039***	−0.0031***	−0.00035	−0.9219
BREC*lift	−0.0960***	−0.0230	−0.0598***	−216.887***

***$p<0.01$, **$p<0.05$, *$p<0.1$

Finally, we analysed heterogeneity. We introduced interactions of the BREC-TREC dummy with hedonic characteristics. In summary, the effect of BRECs on selling prices, list prices and the selling to list price ratio is higher than in the regression without interactions, but hedonic characteristics reduce this effect. For instance, a higher number of rooms reduces the effect of BRECs by 4 percentage points, while lists reduces it by 9.6 percentage points. Ten additional square metres also reduce the effect of BRECs on selling prices by nearly 4 percentage points. In the case of list prices, 10 additional square metres also reduce the effect of BRECs by 3 percentage points. An additional bathroom increases the effect of BRECs on the selling to list price ratio, while an additional room and the availability of a lift reduce it. Finally, an additional bathroom increases the effect of BRECs on the TOM, while the availability of a lift reduces it. We do not present the effect of the interactions of the BREC dummy with housing stock and dummies for Madrid and Barcelona because all three are insignificant in all regressions (Table 5).

7 Robustness check: competing theoretical explanations

As pointed out by Levitt and Syverson (2008) and Hendel et al. (2009), the results observed in the data may have different explanations. Recall that both companies compete in the same market (the client is similar), and we have adjusted by housing quality and location (later, we will delve further in the discussion about unobserved characteristics). These explanations can be divided into two groups: within-competitive market factors (unobserved differences, greater patience of one agent; lower risk aversion of BRECs) and out-of-competitive market factors (shirking, information asymmetries and incentives).

7.1 Within-competitive market factors

1. Unobserved house characteristics
   We captured up to 78% of the variance in the selling price, which is a large proportion of the total variation. In any case, we have reasons to expect that the influence of unobserved heterogeneity will be small. First, the differences in observed characteristics are not large. Second, in contrast with Hendel et al. (2009), in our case, sellers cannot choose among several platforms. Individual sellers must sell their homes through TRECs, so sellers' attributes cannot be correlated with the company. In fact, once the list price and the expected selling price are fixed, even BRECs sell many of their homes through

TRECs.[3] Finally, our results are not easily compatible with a model in which BREC houses are more attractive on unobservable dimensions. If that were the case, one would expect a lower TOM for BREC homes. The gap in unobserved differences is therefore small. However, to check the importance of potential selection on unobservables more accurately, we adopt the approach of Altonji et al. (2005), developed theoretically by Oster (2019). In our case, the value of δ that leads to $\beta = 0$ (no relationship) is 5.10[4] (see Table 12). This result implies that the selection on unobservables would have to be more than five times stronger than the selection on observables to attribute all of the effect of the BREC versus TREC dummy to selection bias, which is highly unlikely. Oster (2019) argues that setting δ to 1, which "formalizes the idea that selection on unobservables is the same as selection on observables",[5] is a good benchmark to check the impact of unobservable variables on the estimation. In our case, this estimation generates a value of 0.38. If we accept that there is causality only if the identified set excludes zero, which holds in our case, we cannot reject the differential impact of BRECs and TRECs.

2. Greater patience of BRECs
Yavas and Yang (1995) point out that a seller who can wait for a higher-paying buyer may set a higher asking price to attract only buyers who would value this property higher than the market value. The outcomes for this seller are a higher list price, a higher selling price and a longer TOM. BRECs may be more patient than TRECs if they suffer lower costs from maintaining homes in the state required for home showing. Additionally, TREC homes can be owned by sellers who are making job-related moves that are time-sensitive. BREC homes are from foreclosures, evictions, defaults, etc. In these homes, there are no families with time restrictions. If BRECs have lower discount rates than TRECs, BRECs will receive a higher price for an otherwise identical home, offset by a longer TOM. However, some findings point in the opposite direction of this explanation. First, the required differences in discount rates needed to explain our results are larger (30.1%[6]) than those reported in the literature (Genesove & Mayer, 1997). Second, a patient seller searches for the perfect buyer for his dwelling. On the one hand, the perfect buyer is more difficult to find if the dwelling is more atypical. On the other hand, in these cases, higher differences between patient and impatient sellers are expected. Patient sellers will obtain a higher selling price offset with a longer TOM. To test this hypothesis, we construct a measure of atypicality[7] following Haurin (1988), and we add the interaction of this variable with the BREC dummy in the models presented in Table 2. If BRECs are more patient, we expect a positive and significant effect of this interaction. The first two columns of Table 6 show results in the opposite direction. Differences in the TOM, selling price and list price are reduced by atypicality. TRECs are more common brokers for atypical properties than BRECs. One additional point on the atypicality measure (which is close to a 50% increase in the atypicality index) offsets

[3] This fact also exclude differences in expertise to explain our results.
[4] We use the routine PSACALC (STATA code) to produce the results (Table 12).
[5] Altonji, Elder and Taber (2005).
[6] $(1+r/365)^{53.79} = 1.402$; then, $r = 30.1\%$.
[7] The atypicality index is the difference in selling price (using the coefficients of the hedonic model) given the characteristics of the house and the mean values of these characteristics in the sample.

Table 6 Effect of atypicality on differences in outcomes among BRECs and TRECs in the models estimated in Table 2

	Selling price	List price	Selling to list price ratio	TOM
Whole sample				
BREC	0.221**	0.229**	0.001	54**
BREC*atypicality	−0.24**	−0.18**	−0.04**	−47**
BREC sample				
More than one offer	0.02	0.104**	−0.06**	−12.84**

***$p<0.01$, **$p<0.05$, *$p<0.1$

nearly all of the differences between BRECs and TRECs.[8] Financial regulations may explain this result. Additionally, this result may derive from the fact that TRECs select atypical dwellings based on the expectation of selling them at higher prices, knowing ex ante that a longer TOM is needed.

Finally, for special properties (or properties for special buyers), fewer offers are expected. If a BREC is a patient agent, we can expect a longer TOM and higher list and selling prices for properties with fewer offers. For the subsample of BREC transactions, we have information about the number of offers that a property received. A dummy variable is added according to whether this property received more than one offer. For these properties, higher list prices are observed as well as lower price cuts and TOMs, which is the opposite direction of the prediction.

3. Less risk aversion of BRECs

In the case that BRECs are less risk averse than TRECs, they place a lower value on an offer today relative to the expectation of a higher future offer. TREC agents depend exclusively on the housing market. In this sense, TRECs' profit is more sensitive to housing price shocks (especially those related to the sales volume) than BRECs' since these shocks affect all TRECs' earnings (and only a small part of BRECs' earnings). Additionally, TRECs are usually risk averse at the moment they accept a new property in their assets. They can select which properties match demand by looking at the owners' asking price and characteristics of the property that may make that particular house more appealing to buyers. Finally, banks know that public money may be used to rescue financial institutions after economic and financial crises. This possibility can be an additional factor to take into consideration when discussing differences between BRECs and TRECs in terms of risk aversion. What degree of risk aversion is necessary to explain the BREC-TREC gap? Following Levitt and Syverson (2008) and Kocherlakota (1996), we calculate the coefficient of relative risk aversion, which is triple that

[8] Similar results are obtained if we define atypicality in terms of properties with a price or a TOM above the median (Gautier et al., 2018). BRECs that are more patient might be more effective at shifting difficult-to-sell houses (in terms of either a higher cost or a longer TOM). When we interact BREC with a dummy variable that is 1 if the sales price (sales time) is higher than the median, we find that BRECs are less efficient in these cases. See Table 11. Note that the interpretation of the interaction is complicated by the fact that price (sales time) is endogenous. That is, unobserved characteristics that affect sales time also affect the selling price of the house.

Table 7 Effect of the fourth quarter on differences in outcomes between BRECs and TRECs in the models estimated in Table 2

	Selling price	List price
BREC	0.226**	0.237**
BREC*fourth quarter	0.01	−0.004

***$p<0.01$, **$p<0.05$, *$p<0.1$

Table 8 Differences between BRECs and TRECs in outcomes estimated by city type and moment in time

	Selling price	List price	Selling to list price ratio	TOM
Large cities and their provinces	0.17**	0.18**	0.04	74**
Remaining cities	0.37**	0.32**	0.05**	15**

***$p<0.01$, **$p<0.05$, *$p<0.1$

in Levitt and Syverson (2008).[9] Therefore, this risk aversion is even more implausibly high according to the usual values in the literature.

7.2 Out-of-competitive market factors

4. Shirking
   Among the explanations outside the framework of competitive markets, we first examine the possibility of shirking on effort. TREC shirking may affect offers by reducing the rate at which offers arrive or by generating offers from a lower price distribution. That is, the agent may shirk by hiding offers, reducing the real price of the offer and reducing its variability. Burdett and Ondrich (1985) show that in a labour market setting, some consequences of TREC shirking (lower offer arrival, lower mean and variance in the offer) imply a longer TOM. These predictions contrast with our findings. Furthermore, for shirking to be important, it must be difficult to observe TREC agents' level of effort (Levitt & Syverson, 2008). Many tasks performed by an agent can be easily observed. Another way to test this explanation is to consider that TRECs may exert more effort in the fourth quarter to meet their annual sales targets. However, as we pointed out earlier, BRECs commercialize many of their properties through TRECs, so we can consider this effect to be absent for BREC properties. Using the same specification as in Table 4, we interact our BREC dummy with a dummy for the fourth quarter (Table 7). The results do not show evidence of shirking since the interaction is not statistically significant.
5. Information and different incentives
   Previous potential explanations are inadequate to explain the magnitude of our findings. In this sense, we found room for differences in incentives. BRECs obtain 100% of the incremental profit of the sale, so they have an incentive to maximize price, while TRECs have an incentive to sell the house quickly. Our results support this explanation. Even in the case that TRECs commercialize BRECs properties, the evidence indicates that

[9] For the TREC to prefer an offer-in-hand X with certainty to one equal to kX, where k is normally distributed with a mean of 1.229 and a standard deviation of 0.402, the TREC must have a coefficient of relative risk aversion greater than 5.5.

Table 9 Differences in list prices estimated based on whether evidence exists for a reference point or loss-averse agent behaviour, BREC subsample

	List price
Reference point (list price > = appraisal price)	0.13**
Loss-averse agent (List price > = net book value)	0.17**

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

TRECs serve individual sellers differently than BREC sellers, according to their incentives and policies.

In addition, in Table 8, we present new evidence that the gap between TRECs and BRECs varies with their incentives. In large cities, the volume of transactions is higher, and the buyer can learn about the reference price simply by gathering information on nearby sales prices. In small cities, however, buyers can obtain less information about homes on the market, and the advantage of TRECs and BRECs with respect to individual sellers is higher, so we should observe a higher gap between TRECs and BRECs. We proxy the informational advantage by estimating outcomes for two groups: large cities and the provinces these cities are in, on the one hand, and remaining cities, on the other. As we show in Table 8, a shorter TOM as well as higher list and selling prices are observed for cities in the second group. That is, where BRECs have a higher information advantage due to the absence of comparable homes, they obtain the target selling price and do so sooner. Additionally, a lower price discount is observed.

6. Explanations from behavioural economics

Previous evidence of incentives leaves room for strategic behaviour. Throughout the paper, we have noted that BRECs prefer the marketing strategy of setting a higher list price and later conceding a higher discount. From behavioural economics, we know that this strategy gives BRECs a social image of fairness based on the possibility of buyers obtaining a good deal. However, additional explanations from behavioural economics could produce the same outcomes: higher list and selling prices. First, sellers may know that the asking price could serve as an anchor or heuristic used by a buyer to judge the property value. In this case, buyers may not be able to adjust sufficiently away from the anchor to arrive at the real market price (Northcraft & Neale, 1987). In this sense, strategic behaviour consisting of setting a higher list price is also a better way for BRECs to maximize benefits because TRECs recommend underpricing even in hot markets (Bucchianeri & Minson, 2013). For us, it is impossible to disentangle this anchor effect from the hypothesized fairness effect.

Second, according to prospect theory (Kahneman & Tversky, 1979) applied to the housing market (Genesove & Mayer, 2001), loss-averse agents take the original purchase price as their reference point. Based on mental accounting and the associated need to break even, sellers may set a higher list price, especially in bust periods. In this case, the original purchase price acts as a reservation price to avoid losses. This theory principally affects BRECs since they commercialize their own assets. In this respect, we exploit additional information in the subsample of BREC transactions. For BRECs, the original purchase price is the appraisal price. Here, we have information about not only the appraisal price but also the net book value of every asset. Two hypotheses can be tested. First, higher list prices may be expected for transactions in which a reference point exists, that is, transactions in which list prices are greater than or equal to the appraisal price (34.66%). On the other hand, higher list prices may be expected for transactions in which BRECs act as a

loss-averse agent, that is, for transactions in which the list price is greater than or equal to the net book value (51.32%). Table 9 presents the results for the differences in outcomes for transactions that either include a reference or in which the BREC acts as a loss-averse agent. In both cases, this fact is captured by including a dummy variable in the baseline models estimated in Table 4 for the BREC subsample. Higher list prices are observed in both cases. This result can be interpreted as evidence for prospect theory since we observe higher list prices with higher appraisal prices or when list prices are equal to or higher than the net value. Therefore, in this case, BRECs act as loss-averse agents.

8 Conclusions

In this paper, we examine the relative performance of two competing types of companies: TRECs and BRECs. Our results suggest a higher selling price and a longer TOM for BRECs than for TRECs. Our findings are consistent with explanations related to dynamics within and outside competitive markets. However, within-competitive market drivers either are rejected or are inadequate to explain the magnitudes of the coefficients when more in-depth analysis is performed. The empirical estimates suggest that information in the housing market may also be a source of distortions. In fact, the main aim of the sale varies depending on company incentives. Namely, BRECs own the property, so their incentive is to maximize the selling price, while TRECs seek to minimize the TOM. Individual homeowners are induced by their agents to sell quickly and at a lower price with respect to bank homeowners. On this point, we must add the caveat that this rule cannot be extended ad infinitum. For BRECs, a longer TOM also implies balance sheet and monetary costs in terms of higher provisions and less money to lend. Longer TOMs might occur because BRECs are "forced" to set higher prices for assets to cover losses on properties that are difficult to sell.[10] In this sense, the results can also be interpreted as evidence of misaligned incentives between banks (monetary costs) and bank-owned brokerage companies (maximize benefits).[11]

Finally, the higher list prices observed for BRECs are consistent with the behavioural economics framework (Kahneman et al., 1986a, 1986b; Thaler, 2015). BRECs prefer to set a higher list price rather than to reduce list prices only reluctantly. This strategy produces an impression of fairness in the buyer, who, unaware of the reference price, believes she has obtained a good deal. Hence, this strategy permits BRECs to maintain the loyalty of future customers while maximizing profit. Additionally, this strategic behaviour is consistent with the anchor effect and prospect theory.

Levitt and Syverson (2008) examine why reputation concerns do not discipline real estate agents more effectively. They provide two possible explanations. First, it is difficult for agents to engage in repeat business with a given client. Second, the counterfactual outcome is not observed. Additionally, these authors express surprise that sellers do not more frequently hire independent appraisers to inform them of the value of their homes since the information provided to home sellers is an important part of that service. According to Levitt and Syverson (2008), an appraiser is disinterested in the final transaction price. However, recent evidence (Ben-David, 2011; Akin et al., 2014) shows that appraisers are not independent and introduce an upwards bias in their valuations.

[10] In contrast to Campbell et al. (2011), forced sales discounts are not observed at this moment.

[11] In fact, banks have eliminated these companies, which are currently independent.

As long as banks are expected to keep housing assets on their balance sheets for a long time, data for the coming years will allow us to study whether these differences are constant over time or vary with the cyclicality of the market and the consolidation of banking structures.

In terms of limitations, we find evidence of different selling strategies adopted by BRECs and TRECs and that this difference cannot be explained by unobserved heterogeneity. However, we cannot be sure that all the differences found are not due to unobserved heterogeneity. First, the premium price found for BRECs (20%) is large in that it is higher than that previously reported in the literature comparing other agents (Bernheim & Meer, 2013; Hendel et al., 2009; Levitt & Syverson, 2008). This difference also remains when TRECs sell BREC properties. BRECs with large amounts of homes sell some houses through TRECS but control the final price (individual offerings found through TRECs are evaluated by the bank). In this paper, we presented some explanations for this strategy (different incentives and explanations from behavioural economics), but there is still some room for unobserved heterogeneity to explain part of this 20%.

Appendix 1 Examples of BREC advertisement campaigns

See Tables 10, 11 and 12.

Table 10 Hedonic model estimation to obtain the degree of overpricing (DOP)

Variables	List price
TOM	0.000713***
	(4.48e−05)
Number of bathrooms	0.0378***
	(0.00549)
Number of rooms	0.0476***
	(0.00498)
Surface	0.0112***
	(0.000222)
Age	−0.00238***
	(0.000192)
Conservation	0.133***
	(0.00678)
Lift	0.186***
	(0.00736)
Madrid	0.263**
	(0.107)
Barcelona	0.300***
	(0.0821)
Constant	3.855***
	(0.253)
Observations	6588
R-squared	0.78

Standard errors in parentheses

***$p<0.01$, **$p<0.05$, *$p<0.1$

Table 11 Effect of an above-the-median price or a TOM on differences in outcomes among BRECs and TRECs

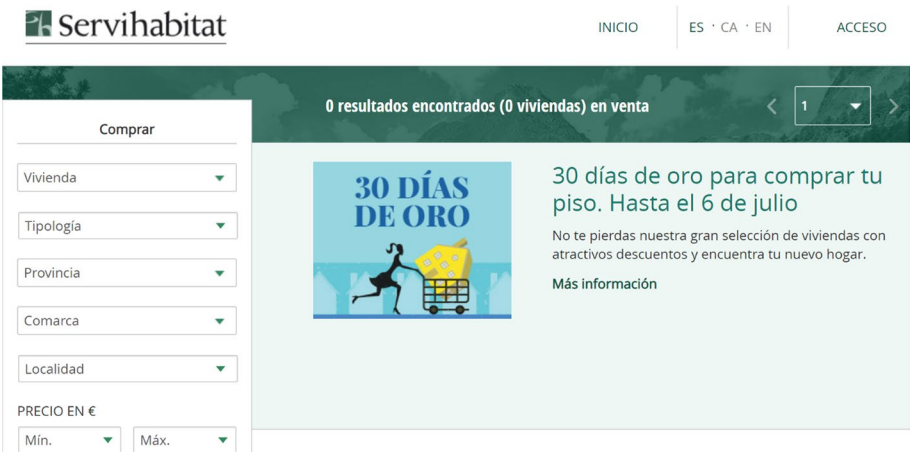
	Selling price	List price	Selling to list price ratio	TOM
BREC	0.43***	0.41***	0.02***	61.07***
BRECxAbove the median	−0.37***	−0.32***	−0.04***	−10.72***
BREC	0.24***	0.25***	−0.009	106.35***
BRECxAbove the median TOM	−0.09	−0.02**	0.012**	−90.93***

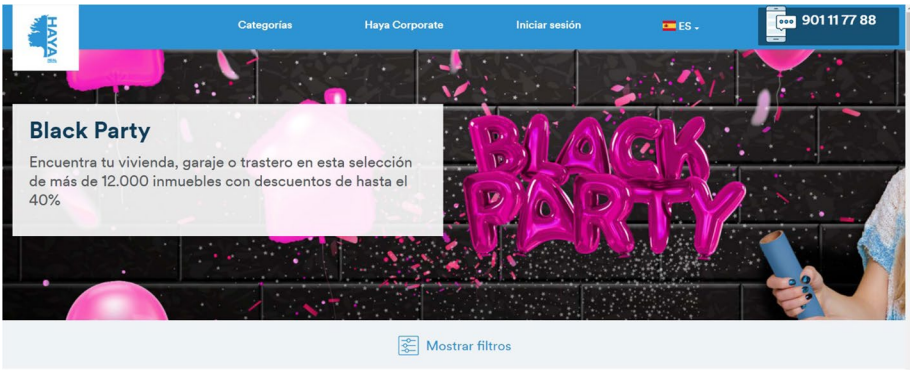
***p <0.01, **p<0.05, *p<0.1

Table 12 Oster estimation

	δ to produce $\beta = 0$	β
With mcontrols	5.10	
$\delta = 1$		0.38

β is the effect of BRECs on selling prices, δ is the degree of proportionality between observables and unobservables, and mcontrols represent stock, time and location dummies





The structure of the banks' real estate cost is quite different from that of a traditional broker. Banks must finance their properties at the cost of capital until they sell them. In addition, for every year that they keep the property in their balance sheet, they must charge provisions, thus reducing their profits. Banks also offer better financing conditions for the real estate they sell than on properties sold by other agents in the market. For instance, a bank can offer to finance 100% of the property price instead of the maximum of 80% set for properties not owned by the bank.

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