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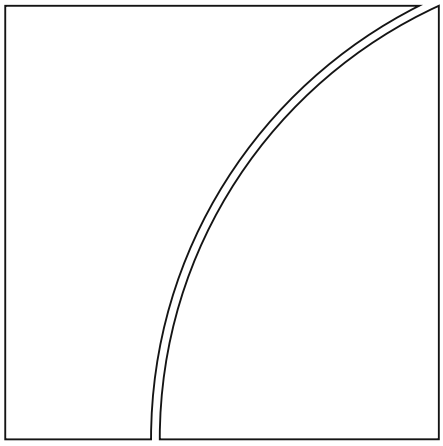

BIS Working Papers

No 575

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by Ryan N Banerjee and Kristian S Blickle

Monetary and Economic Department

August 2016

JEL classification: G30, G32, O47, R30

Keywords: firm financing, capital structure, housing collateral, employment

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This publication is available on the BIS website (www.bis.org).

ISSN 1020-0959 (print)
ISSN 1682-7678 (online)

HOUSING COLLATERAL AND SMALL FIRM ACTIVITY IN EUROPE*

Ryan N. Banerjee[+] and Kristian S. Blickle[⊥]

First distributed: November 2015

This version: August 2016

Abstract:

We investigate the importance of the housing-based collateral lending channel on firm borrowing, investment and employment. We focus on small firms in France, Italy, Spain and the United Kingdom. To identify a credit supply effect, as opposed to a home-equity driven demand effect, we compare activity in similar firms that differ by the degree of financial opacity, and therefore the degree of their reliance on collateral to overcome borrowing constraints. We find that changing house prices have a more pronounced effect on borrowing, investment and employment in financially more opaque firms. This relationship is particularly strong in southern Europe (Italy and Spain), where financial frictions are larger and the use of collateral more important.

JEL codes: G30, G32, O47, R30

Key words: firm financing, capital structure, housing collateral, employment

* We would like to thank Yakov Amihud, Martin Brown, Leonardo Gambacorta, Emilia Garcia-Appendini, Galina Hale, Vasso Ioannidou, Tor Jacobson, Sebnem Kalemli-Ozcan, Cathérine Koch, Gianni LaCava, Dubravko Mihaljek, Markus Schmid, Serafeim Tsoukas, an anonymous referee as well as seminar participants at the Bank for International Settlements, European Investment Bank and the University of St. Gallen for helpful comments and suggestions. We would also like to thank Francesco Zolli for the updated Italian regional house price data. The views expressed here are those of the authors only, and not necessarily those of the Bank for International Settlements.

+ Corresponding author. Bank for International Settlements, Centralbahnplatz 2, CH-4002 Basel, Switzerland. Tel: +41 61 280 8305. Fax: +41 61 280 9100. Email: ryan.banerjee@bis.org

⊥ University of St. Gallen, School of Finance (SoF). Email: kristian.blickle@unisg.ch

1. INTRODUCTION

Since the Great Recession and the European sovereign debt crisis, difficulties faced by small and medium enterprises (SMEs) in accessing finance have featured prominently in policy debates throughout Europe. However, even prior to the financial crisis, small and younger firms have typically faced greater difficulties in accessing finance due to greater informational asymmetries (Gertler and Gilchrist, 1994; Beck et al, 2006). Firms can overcome informational asymmetries by pledging collateral, which enhances their borrowing capacity (Barro, 1976; Stiglitz and Weiss, 1981; Hart and Moore, 1994). Seminal papers by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) suggest that improvements in collateral values ease credit constraints for borrowers and affect economic activity.

In this paper we use firm level data to examine the collateral lending channel in small and young firms where information asymmetries are greatest and therefore, where the channel is likely to be strongest. Specifically, we focus on the impact of changes in regional house prices on firm borrowing, investment and employment in small firms in Italy, France, Spain and the United Kingdom. As recent research has found significant heterogeneity in financial frictions between northern and southern Europe (Kalemli-Ozcan et al, 2015), our results contribute to this literature by examining cross-country heterogeneity of the collateral lending channel within Europe.

In general, the channel through which house prices act on firm activity need not be limited to a credit supply effect. Several papers discuss the impact of house prices on aggregate demand. For example, Mian and Sufi (2012) consider the effect of the decrease in household borrowing based on the value of their housing equity on consumption and employment. In European countries (especially in our sample), mortgaging a house for consumer spending is not easily possible, especially since second mortgages on a home are prohibited. There may still be a wealth effect, however, in that households feel wealthier due to rising house prices and consume.

The intertwined nature of the impact of house prices on credit supply and demand suggests that isolating the collateral lending channel is a challenge. We address the influence of demand on firm development by restricting our dataset to very small firms – those with less than $500,000 in total assets. Within a given region and industry, aggregate consumer demand should affect firms of comparable size to the same degree. For these firms, moreover, the value of housing collateral is large enough, relative to firm size, to be a significant in determinant of their capital structure.[1] This is arguably less likely for large corporations, whose responsiveness to aggregate real-estate price changes may be demand-based. Within a group of homogenous small firms, we identify the collateral channel effect by estimating the additional effect of regional house price changes on firms that are, all else equal, more opaque. For these firms, collateral plays a relatively greater role in reducing information asymmetries and facilitating

[1] This is one of the reasons why we make use of house prices to proxy collateral: the price of an average house is significant relative to the average loan size for firms in our sample. The second reason is that the use of housing collateral is widespread among small and opaque firms, as discussed below.

access to credit. Specifically, we estimate the additional impact of a change in regional residential house prices on extremely small firms (<100,000 in assets) compared to slightly larger firms (<500,000 in assets) and on young firms (<5 years old) relative to (similarly sized) older firms. In addition, we also compare the impact of house prices on firms in industries that make greater use of external financing relative to firms in industries that do not, following Rajan and Zingales (1998). We perform a number of checks to help make the case that our results are not shaped by consumer demand.

We find that changes in local house prices have a larger impact on firms which are more likely to be financially constrained, and that these effects are stronger in southern Europe. In Spain and Italy, a 1%-point change in the growth of collateral values induces, respectively, a 0.8%-point change in liabilities and a similarly sized change in investment of a firm. Our results indicate that the collateral lending channel is weaker in France, and weaker still in the United Kingdom, where it is limited to small firms.

As a consequence, the economic effect of changing house prices is the largest in Spain, but much smaller in France and the United Kingdom. A $1 increase in the average house price raises investment in constrained Spanish firms by as much as $0.34[2]. In Italy, the effect is slightly smaller, ($0.13), while in France and the United Kingdom, the magnitude is smaller still, ranging from $0.02 to $0.01. Although we use a different identification strategy, our estimates on investment are consistent with to those found in France by Chaney et al (2015) the United Kingdom by and Bahaj et al (2016). They are also similar in magnitude to Chaney et al (2012) who consider the effects of changing collateral values for large firms in the United States.

We furthermore find that changes in collateral values affect mostly young firm employment. However, we do not find a similar effect for small firms. This is consistent with the finding that older firms grow less rapidly, financing increases in employment from current revenues rather than bank borrowing. We thereby confirm an observation by Adelino et al (2015), who conjectured that the impact of house prices on small firms was driven by young firms, but were unable to test this proposition with their data.

Several recent papers explored the impact of housing collateral on employment. Using US county level data, Adelino et al (2015) found that rising house prices had a positive impact on small relative to large firm employment in the same geographical region in 2002–07. Chaney et al (2012) examined the relationship between collateral and investment using firm-level data for US listed corporations. They found that increases in the value of firms' collateral boosted investment. Schmalz et al (2013) found that housing wealth was an important factor in the decision to start a new firm, as well as a determinant of growth, investment and employment of new firms in France.

Our paper extends the existing literature on the lending collateral channel by comparing its impact across the countries where the importance of collateral may conceivably vary (see

[2] Dollar effects are approximations, calculated by multiplying the estimated regression coefficient by the ratio of average house prices in a country to the average level of the dependent variable over our sample period.

below). By applying the same empirical strategy, this enables us to examine similarities and differences across countries. Moreover, our empirical strategy is also novel in that it identifies the effect for an important group of young and small firms that have received only limited attention in this context so far. In addition, we analyse the importance of collateral for different sources of opaqueness to examine where the collateral lending channel has the greatest effects.

Our paper joins several other studies that recently analysed the interplay between house prices and firm activity. Kleiner (2015) examined the impact of changes in UK firms' collateral value on changes in employment, capital stock and borrowing at the firm level. Fort et al (2014) found that the collapse of house prices accounted for a significant part of the large decline of employment growth in young and small businesses. Mehrotra and Sergeyev (2015) found that declines in US housing prices diminished job creation and job destruction, with a larger impact on smaller and younger firms, consistent with the collateral channel. Pinter (2015) found that regional UK house prices declines were associated with higher unemployment and estimated a model with collateral constraints to explain this result. Banerjee (2015) found that following the protracted financial crisis in Europe, financial constraints reduced profitability in the cohort of firms that were start-ups just before the financial crisis. Giroud and Mueller (2015) found that the regional variation in unemployment due to house price declines was almost entirely driven by the shedding of workers in firms that had an above median increase in leverage in 2002–06, i.e. firms that were more likely to be financially constrained at the start of the recession.

The remainder of the paper is organized as follows. Section 2 details our data and presents some preliminary statistics and visual results. It also outlines our methodology in greater detail. Section 3 explores some of our results and their robustness to alternate specifications of our model. Section 4 briefly concludes the study.

2. DATA AND EMPIRICAL METHODOLOGY

2.1 The collateral channel across countries

Our identification strategy is predicated on the fact that small and young firms are expected to be more sensitive to changes in the value of collateral. The notion that these opaque firms require collateral for loans is supported by academic studies, as discussed above, as well as by the opinions of firms themselves, as elicited in surveys. For example, in 2015, the ECB's Survey on the Access to Finance of Enterprises (SAFE) asked a new question about the use of collateral by firms. Overall, for Spain, Italy and France (the UK is not included in the survey), 62% of firms with less than 50 employees report that their latest financing required collateral. This compares with only 46% for larger firms. For these small firms, the owner's own house is an important source of collateral: 30% of firms with less than 50 employees report using personal assets, including their own house as collateral.[3] In contrast, only 5% of large firms

[3] As the average size of small firms sampled by the SAFE survey is larger than firms studied in this paper, this figure probably underestimates the fraction of small firms which use personal assets as collateral.

report using personal assets as collateral. Collateral is also particularly important for young firms. From the firms surveyed, 100% of firms less than 5 years since incorporation required collateral for financing, compared to just 47% for older firms.

We conjecture that this reliance of firms on housing collateral will vary across countries. The main drivers of these differences are financial frictions and homeownership rates. First and foremost, financial frictions vary across countries. The degree to which collateral eases financial constraints in opaque firms will vary accordingly. The SAFE survey corroborates this notion. The use of collateral, especially land and buildings, is most prevalent in Spain. Here 80% of companies with 10–50 employees indicate the need for collateral in obtaining loans. In Italy, the proportion remains high at 57%, while it is lowest in France, at 44%.[4]

As shown by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998 & 2000) lending decisions of financial institutions are sensitive to legal systems, which shape loan recovery rates. Legal systems that lower the value of collateral, from a bank's perspective, will require companies to post more in order to avoid higher interest rates or credit rationing (Benmelech and Bergman, 2009; Cerqueiro, Ongena and Roszbach 2014). The World Bank's *Doing Business Indicators* show that financial frictions, measured by the time needed to enforce contracts, vary across the countries in our sample. The indicator shows that, in 2006, the time required to enforce contracts was longest in Italy (1,210 days), followed by Spain (515 days), France (331 days) and the United Kingdom (229 days). Conceivably, banks will be more likely to demand significant amounts of collateral from constrained firms in economies where enforcement of contracts is more complicated so as to be compensated for the cost of contract enforcement.

The second possible driver of the differences in the importance of real estate collateral across countries may be differences in the home ownership rate. According to Eurostat, ownership rates were highest in Spain at 80%, similar in Italy and the UK at 73% and lowest in France, at 63% in 2008. During our sample period, it was very difficult for home owners to take out a second mortgage on their home in any of the countries under consideration (IMF, 2008). It may be more accurate, therefore, to compare the home ownership rates adjusted for households that already have a mortgage. Nearly 58% of households in Italy and 48% of households in Spain qualify. Conversely, only 35% of households in France and 27% of households in the UK own a home without being encumbered by a mortgage. We might reasonably expect a greater correlation between real estate prices and borrowing at the aggregate level, in countries where entrepreneurs and small business have more unencumbered housing collateral. Moreover, opaque firms will be more likely to have housing collateral to pledge and hence alleviate borrowing constraints, increasing the average estimated sensitivity of opaque firms to changes in house prices. A combination of legal financial frictions and home ownership rates likely determine the importance of housing collateral. Accordingly, we expect the strongest effects

[4] It is perhaps noteworthy that the importance of collateral for French firms does not diminish rapidly by size. In Spain and Italy, however, the proportion of firms requiring collateral to obtain a loan diminishes quicly with size.

of changes ion house prices on firm activity in Spain and Italy, where frictions and ownership rates are high compared with the UK and France.

One can observe different macroeconomic correlations between the changes in the value of housing and aggregate lending growth across the countries in our sample (Appendix Figure A1). Importantly, from the perspective of this paper, the correlation is especially pronounced for Italy and Spain, but weaker for France and the United Kingdom. While, this may be indicative evidence of differences in the importance of collateral in overcoming credit constraints, this may also reflect the differential effect of housing wealth on demand. We need to turn to more careful identification to isolate the collateral channel.

2.2 Data description and summary statistics

We focus on Italy, France, Spain and the United Kingdom for two reasons. First, balance sheet data are available for a large number of companies. Second, as discussed above, financial frictions and the associated importance of collateral are likely greater in Italy and Spain than in France and the United Kingdom. We can therefore investigate the credit supply channel in these heterogeneous countries.

We use firm-level accounting data from AMADEUS database provided by Bureau van Dijk. The data is collected from local company registers and available at annual frequency. We use data for 2004–2012. These years include a period of economic and house price growth, and the onset of the financial and sovereign debt crises. The raw data from AMADEUS database cover around 700,000 firms per year in Spain, 900,000 in Italy, 1,000,000 in France and 500,000 in the United Kingdom.[5]

Our sample is restricted to very small firms – those with less than $500,000 in assets and covers only unconsolidated entities to avoid double counting. We further remove extreme outliers that are likely to be a result of coding errors. In particular, we remove firms whose liabilities exceed their total assets by a significant factor. As a cut-off, we make use of 1.2 in our main specifications.[6] We also drop all financial, insurance, real estate, construction, agricultural and mining firms[7]. We require firms to be recorded for more than 2 periods.

Our dependent variables and the majority of our independent variables are expressed as year-on-year changes. Consequently, ratios and year-on-year changes are winsorized on an annual basis at the 5% level. We assess the sensitivity of our results to these data cleaning choices in the robustness section of the paper. As a key variable is firm age, we allow for firm entry. As

[5] Data were downloaded via Wharton Research Data Services (WRDS), provided by the Wharton School, University of Pennsylvania. Each year was downloaded individually to avoid complications or variable processing errors sometimes associated with large bulk downloads, as discussed in Kalemli-Ozcan et al (2015).

[6] This step removes 5% of all SMEs and just over 10% of all firms with less than $500,000 in assets.

[7] Particularly for companies whose business model focuses on real estate, it may be difficult to disentangle which aspect of their growth is driven by an alleviation of borrowing constraints as opposed to trends in the housing market.

a result, our panel is unbalanced. Firm age is defined as the number of years since incorporation.[8]

Our final sample includes over 260,000 firms in Spain and Italy, over 400,000 in France, and over 90,000 in the United Kingdom. The majority of these are very small, with total assets of less than $250,000, i.e. firms where changes in house prices are likely to have a significant impact on the amount of pledgeable collateral available for the firm's financing needs. Figure 1 shows the distribution of firm-year observations by asset size for all small and medium enterprises (SMEs). Mean turnover of firms in our sample of firms with less than $500,000 in assets is approximately $300,000, which is fairly consistent across Italy, France and Spain. In the United Kingdom, mean turnover was significantly smaller, at only $150,000.

[Figure 1 about here]

For our dependent variables of interest, we look at firm borrowing, employment and annual investment. We define borrowing as the sum of current liabilities plus non-current liabilities. Investment is defined as the change in total fixed assets plus depreciation divided by lagged total fixed assets. For employment, we consider total employees as reported by the firm. Firm-level borrowing grows by between 10 and 20% per year in our sample and annual investment around 30 – 40% of the book value of total fixed assets. Investment, however, is highly sporadic with some firms investing large sums in a single year and not at all in most others. Firm employment grows by around 5% per year, though it is somewhat higher in Italy. Due to the possible selection bias in our sample, given that not all firms in an economy report detailed information (and AMADEUS does not cover all those that do), these figures are likely to be higher than the average growth of firms in the economy

Our independent firm-level variables include log turnover, leverage (defined as the ratio of total debt to total assets), the cash to turnover ratio and earnings before interest and tax to total assets. We also include sales in a region-industry cell as a control variable for regional demand. This measure is constructed by taking the sum of sales per industry (defined by two digit NACE classifications) for the region in which a respective firm is headquartered. Table 1 displays some univariate characteristics for firms with less than $500,000 in assets. The variation across the three countries is broadly similar. Mean total assets are approximately $200,000, mean leverage is approximately 60% and average EBIT varies between $10.000 and $21.000, with highest EBITs being earned in the UK[9]. Around a third of our sample are firms with less than $100,000 in assets and a similar proportion are younger than 5 years. The mean firm has 5 employees.

[Table 1 about here]

We merge our firm-level data with information on local housing markets from a variety of sources. Our regional house price data for each the years between 2004 and 2012 for Spain comes from Euroval. It measures the square-meter price of average residential property at the

[9] These differences become more pronounced when EBIT is analysed relative to turnover.

level of the 17 autonomous communities. In 2014, for instance, the average price for a Spanish home, over all the regions and years in our data, was approximately $190,000 for a 100 square metre apartment. For Italy, we use house price data for the 21 provinces from Muzzicato et al (2008) extended to 2013. French regional house price data are provided by the office of French notaries, available for the 21 "régions". For the United Kingdom, house price data come from Nationwide for the different regions in England, as well as for Scotland and Wales (as a whole).[10] We refer to autonomous communities, provinces and régions by the more general term "region" for simplicity. We match these regions to individual firms according to the zip-code of each firm's headquarters.[11] We implicitly assume that small firms (or their owners) only pledge real estate close to the firm's headquarters. This assumption seems plausible for small firms. We also assume that at least some small firm owners own real estate and that real estate ownership is distributed relatively uniformly between opaque and less opaque firms.

[Figure 2 about here]

Figure 2, Panel A, shows the house price trends (at the national level) for the countries in our sample. In both Spain and Italy, a price boom before 2007 is followed by either a steady decline (as in Spain) or by a subdued state of limited growth (as in Italy). In France and the UK, the crisis precipitates a two year fall in house prices. After 2009, however, prices continue to rise, in many regions of France, and exceed levels reached in 2007. In the UK, prices recover somewhat after the crisis but remain relatively constant for several years thereafter. Our identification (discussed in detail below) relies not only on the time-series variation in house prices but also on the cross sectional variation between regions. Panel B of Figure 2 depicts the development of house prices for a few selected regions in Spain. Some heterogeneity in the development of house prices may be observed. Particularly some urban centres, such as Madrid, experience an earlier onset of the crisis and a more pronounced decline in real-estate prices between 2008 and 2012. Other Spanish regions see prices rise intermittently during a period of overall decline.

[Figure 3 about here]

In our analysis we aim to show that financially constrained firms are more sensitive to changes in the value of residential real estate. Figure 3 illustrates the basic insights from our analysis in a set of four country graphs. We plot growth in house prices in a given region for a given year against average growth in firm liabilities in the region. In red, we plot observations for firms that are more financially constrained, and in blue firms that are less financially constrained. The left-hand panel compares small firms (<$100,000 in assets) with larger firms (<$500,000 in total assets); the middle panel young and older firms; the right-hand panel firms that make more and less use of external finance.[12]

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[10] We omit Northern Ireland from the analysis, given that few firms are headquartered there and house prices move very erratically.

[11] Given that we focus primarily on very small firms, it is unlikely that these hold real estate at locations other than their primary base of operations (i.e. in different regions or countries).

[12] We define industries that make use of external financing at the two-digit NACE-code level

In Italy, France and Spain there is a positive relationship between the changes in company liabilities and local house prices. However, the graphs also show that the relationship is more pronounced for companies that are more financially constrained (red lines). The degree to which the relationship differs between constrained and ostensibly less constrained firms varies across countries and measures used. In Spain, the relationship holds for all three measures. In Italy, the slope is steeper for very small firms and those using more external finance, but not for younger firms. In France, the slope is steeper only for younger firms. In the United Kingdom, differences between the two groups are not visually apparent.

In order to test more formally whether the relationships shown in Figure 3 are statistically and economically significant, we perform a more detailed set of regression analyses.

2.3 Empirical methodology

Our basic specification is similar to Adelino et al (2015) and follows a difference-in-difference approach proposed by Rajan and Zingales (1998) to identify the collateral lending channel. Ultimately, we seek to estimate how more financially constrained firms (i.e. firms that are opaque or reliant on external financing) are affected by a shock to regional house prices compared to similar but financially less constrained firms. We attempt to control for local consumer demand effects, which may in turn drive corporate demand for credit, investment and employment, and firm-specific factors with our confounding variables and regression specification.

We run different specifications of the following equation, separately for Italy, France, Spain and the United Kingdom. Specifically, for firm *i*, at date *t*, registered in region *r*, in industry l, we estimate the impact of housing collateral changes on the variable of interest Y_{it}^{r} with the regression:

$$\Delta Y_{it}^{r} = \beta_1 D_{it-1} + \beta_2 \Delta HP_{t}^{r} \cdot D_{it-1} + \gamma X_{it-1} + \alpha_{t}^{r} + \theta^{l} + \varepsilon_{it} \quad (1)$$

The dependent variables considered, ΔY_{it}^{r}, are the annual growth rate of total debt, annual investment as a ratio of lagged total assets, and annual growth rate of employment.[13] D_{it-1} is our indicator variable which captures either firm opacity. We consider three measures of D_{it-1}: (a) small firms with fixed assets less than $100,000; (b) young firms, i.e. those less than five years old (since incorporation); and (c) firms in industries that make greater use of external finance, following Rajan and Zingales (1998). We define a firm as more exposed to external finance if mean investment minus cash flow over investment is in the 75th percentile of the firm's industry group, and as less exposed if it is in the 25th percentile. We test the impact of these variables in regressions when they are included separately as well as simultaneously. ΔHP_{it}^{r} denotes the change in the real estate index in region r for year t. The coefficient of interest in our regressions is β_2 on the interaction term $\Delta HP_{it}^{r} \cdot D_{it-1}$. It identifies

[13] Using growth rates (i.e. relative first differences) allows us to make use of a pooled OLS regression while also removing those company characteristics that we cannot capture, but do not change from one year to the next.

the additional impact of changing collateral constraints (due to changes in the value of housing collateral) on more financially constrained firms versus their less constrained but otherwise similar counterparts.

We use a vector of firm-level control variables, X_{it-1}. This includes: cash to turnover, capturing the amount of internal funds available; earnings before interest and tax (EBIT) to turnover, capturing firm profitability; leverage, capturing the degree to which the firm has already made use of debt financing; and industry level sales in the region in each period. This latter variable attempts to capture industry-specific fluctuations in consumer demand within a region.

To further control for region-specific annual demand, we also include *region*time* fixed effects, α_t^r. Given that these remove any variation observable only at the regional level, they also capture the overall impact of house prices on firm activity in a region. However, as the overall effect of a change in house prices may include a demand component alongside a supply effect, we do not seek to interpret this effect. Finally, we also include time-invariant industry level dummies, θ^l. Standard errors are clustered by industry.

In our baseline regressions, we do not include firm fixed effects as there is very limited time variation in our measures of financially constrained firms in our data. By estimating our regression with percentage changes in borrowing and employment we still control for firm specific characteristics that do not vary between individual years. Qualitatively, our results hold when we run very similar specifications that include firm fixed effects.

As shown by the SAFE survey, the importance of residential housing as collateral for debt finance is most important for smaller and younger firms. For these firms, total borrowing of the firm is not significantly greater than the value of typical residential real estate. To better compare the impact of house prices on firms for which entrepreneurial housing collateral is most important, we restrict our analysis to firms with total assets less than $500,000, as discussed. This restricted sample places a greater burden on our estimation as variation across our dummy variables in this sample are likely to be smaller.

2.4 Empirical Considerations

It should be mentioned explicitly that we do not make use of a firm's actual real estate holdings. Rather, our identification relies on cross sectional variation of average residential real estate prices, similar to Adelino et al (2015). Company-specific real estate holdings are not regularly reported in AMADEUS (especially for small companies). Moreover, collateral used for borrowing in our sample may be the owner's own home and not reported on a firm's balance sheet. Of course, it is possible, that not all companies make use of housing collateral to the same degree; it can depend on preferences However, the high rates of ownership in the countries in our sample, coupled with the preference of banks for housing collateral, imply that we possibly estimate an average effect.

The collateral lending channel posits that changes in house prices ease firm collateral constraints, which then leads to changes in economic activity. However, it is possible that

causality runs in the opposite direction, whereby local productivity innovations generate higher economic activity and this boosts local house prices. To address this concern, US based studies often instrument house price changes with a measure of exogenous geographical constraints developed by Saiz (2010).

As we don't have access to a similar instrument for European economies we instead use a restricted sample of only very small firms with less than $500,000 in assets. These firms constitute between 3% and 1% of total assets and between 3% and 5% of turnover of all firms in our full AMADEUS sample, depending on country. Therefore, activity of these firms is relatively small compared to total activity and unlikely to drive house prices. While, it is still possible that the activity of small firms is correlated with regional economic activity the use of *region*time* fixed effects control for the level of activity in the region that could generate reverse causality. By looking at the difference-in-difference of activity of more financially constrained (i.e. opaque) firms in relatively homogenous groups, we thus hope to limit possible sources of endogeneity and identify a supply-channel effect.

A final identifying assumption deserves to be highlighted explicitly. We assume that the opportunities of opaque firms do not have a stronger correlation with real estate prices than the less opaque firms. This assumption seems plausible, given our sample is restricted to a relatively homogenous group of small firms who are likely to face similar opportunities when local real estate prices change. We run a series of robustness tests to address these concerns.

3. RESULTS

3.1 Baseline specification

Our central hypothesis is that the impact of collateral on firm activity is more pronounced in the financially constrained firms that are either more opaque or more reliant on external financing. Moreover, this effect should be stronger in countries that make use of collateralised lending to a greater degree. We find strong evidence that changes in the value of collateral induce a sizeable change in borrowing of more financially constrained firms. This change in liabilities appears to translate into sizeable changes in fixed assets or investment spending. These effects are most pronounced in Spain and Italy, but far less so in France and the United Kingdom.

[Table 2 about here]

Table 2 reports the additional effect of house price growth on the growth of liabilities for financial constrained firms in Italy, France, Spain and the United Kingdom. For brevity, only the coefficient which captures the additional impact of changes in collateral on financially constrained firms is reported. The full regressions can be found in the appendix. Column 1 reports the results where the financial constraint is proxied by a firm being very small (total assets less than $100,000) compared to slightly larger, but still small firms (with total assets of $100,000–500,000).

Overall, when the value of residential real estate increases, small firms increase their borrowing by more than their less constrained, larger counterparts.

- In Spain, a 1%-point increase in house price growth leads to a 0.85%-point increase in borrowing by smaller firms relative to larger firms. The "per dollar" effects, reported in italics. They are calculated using the ratio of average house price in a country to the average of the dependent variable in question. They are time insensitive and should be viewed as approximations. A one dollar increase in home value may increase borrowing by as much as 57 cents.

- In Italy, the effect of house price changes is marginally smaller, resulting in a 0.78%-point increase in borrowing or a 39 cent increase in liabilities.

- In the United Kingdom, the magnitude is approximately a sixth of that in Spain, at 0.14%-points. This implies that a one dollar increase in the value of housing leads very opaque firms to increase borrowing by three cent more than less opaque ones.

- In France, the point estimate is positive, but very small at .06% also implying a 3 cent increase in liabilities.

Column 2 reports results where the financial constraint (i.e. opacity) is proxied by a firm being less than 5 years old since incorporation.

- In Spain, the additional impact of changes in house prices on younger firms is broadly consistent with what is reported in Column 1 for small firms.

- In Italy, the additional impact on young firm borrowing is only 0.3%.

- In France the point estimates indicate that a 1%-point increase in residential house price results in a 0.06%-point increase in firm borrowing. This result is consistent with the finding in Schmalz et al (2015) that housing collateral has a significant positive impact on the borrowing of new entrants. Although statistically significant, the impact of changing collateral values on borrowing of young French firms is an order of magnitude smaller than in Spain: the coefficients suggests that a $1 increase in house prices leads to a $0.04 cent increase in borrowing.

- In the United Kingdom, the impact of higher house prices is small but significant, with a $0.01cent increase in investment per $1 increase in the value of housing collateral.

- In the United Kingdom we observe no significant effect.

In Column 3 we proxy financially constrained firms as those in industries with higher use of external financing. In Spain and Italy, increases in residential house price growth lead to an increase in borrowing of firms in industries with greater external financing needs. We do not find a similar effect in France or the United Kingdom.

Table 3 reports the effect of house price growth on investment. Overall, the increase in borrowing is matched by an increase in investment. This suggests that when house prices increase, firms use some of the increased borrowing capacity to invest.

Column 1 shows the impact of higher house prices on investment to capital stock when we split firms by size.

- In small Spanish and Italian firms, the house price coefficient in the investment regression is almost identical to that for borrowing: following a 1%-point increase in house prices, the ratio of investment to capital in very small firms in Spain increases by around 0.93%-points, and in Italy by 0.76%-points. This implies that a $1 increase in house prices approximately leads to about $0.34 / $0.13 increase in investment by more financial constrained firms in Spain/Italy. This would imply that Spanish and Italian firms use about 80% of new liabilities to invest (averaging across equations).

- In France, consistent with the small impact of collateral values on liabilities, we find a small impact on investments at 0.07%-points. This implies French firms invest close to 50% of the increase in liabilities. Chaney et al. (2015) find a similar, though slightly larger effect. They estimate that a 1% change in prices may lead to a 0.15% change in investments for real estate-holding firms.

- In the United Kingdom we observe an effect of 0.131%-points. This implies that a $1 increase in house prices raises investment by $0.01. This compares to Bahaj et al. (2016) who find that a boost to investment of $0.06 for a $1 increase in house prices.

Column 2 shows the impact of higher house prices on investment when we split firms by age.

- In Spain, following a 1%-point increase in house prices, the investment ratio in younger firms increases by around 0.69%-points.

- In Italy and France, the point estimates are smaller, 0.45% and 0.07%-points respectively.

- In the United Kingdom, we again find no significant effect.

The estimates in Column 3 of changes in collateral values in industries with higher external financing needs are mixed. They are large and strongly significant in Italy but insignificant in the United Kingdom as well as in Spain and France.

[Table 3 on investment here]

Table 4 reports the effect of house price growth on employment growth. Column 1 shows that there is no measured impact of changes in house prices on employment in small firms relative to larger firms, except for a small effect in Spain. However, Column 2 shows that changes in house prices do affect employment in young firms.

- The effect on employment is the strongest in Italy, where a 1%-point increase in house prices results in employment growth of 0.5% points.

- In Spain, employment grows by nearly 0.3%-points, and

- In France by 0.013%-points following a 1%-point increase in house prices.

- We find no real effect in the United Kingdom.

The “per dollar” effects are based on collateral value changes of $10,000. The largest effect occurs in Italian firms, which are estimated to hire up to 0.06 employees more following a house price increase of $10,000. Such price swings are not uncommon within our sample, they are within the standard deviation of house price changes in all four countries in 2004–12. Given the sheer number of small firms in European economies, the aggregate employment effect of the borrowing constraint relaxation brought about by rising house prices could be considerable despite the small effect on each individual firm.

Adelino et al (2015) argue in their US based study that the impact of collateral on small firm employment is driven by young firms. As we can cut our data by both firm age and size, we can confirm their conjecture holds in the European sample: the impact of collateral on employment is important in young but not older small firms. The magnitude of our estimates in Column 2 is broadly consistent with Adelino et al (2015).

Finally, estimates in Column 3 show that in industries with high use of external financing, increases in residential collateral values are associated with significant increases in employment in Spain and Italy, but not France and the United Kingdom.

[Table 4 here]

The above results, on the relationship between real estate and changes in employees, conform to expectations. In particular, old small firms, are more likely to finance employees by revenues generated from regular activities than by taking additional credit. Young firms and, to a lesser extent firms that rely on external finance to secure ongoing operations, however, may need credit for exactly this purpose. Revenues may not yet be consistent or strong enough to facilitate the desired structure and number of employees.

Overall, our results suggest that borrowing, investment and employment are all affected by firms’ credit constraints. In Spain and Italy, small firms and those reliant on external financing in particular make use of the rising value of collateral to expand their borrowing, investment and employment. These effects, though often statistically significant, are much less pronounced in France and the United Kingdom, suggesting either that credit was more readily available or that financial constraints were less relevant for firm growth in these counties. This may be part of the reason why the correlation between aggregate real estate price growth and lending, discussed above, is far less pronounced in these countries.

3.2 Alternative specifications

We run an alternate specification of the baseline model, similar to the approach implemented by Adelino et al (2015). As a firm grows larger or older, it becomes less opaque from the perspective of lenders. The size of the coefficient on the interaction of changing house prices and financial constraint should therefore decrease monotonically with firm size and age. To capture this effect, we define some additional variables for firms that are slightly older and

slightly larger than our original groups of "young" and "small" firms. In particular, we include dummies for firms that are 5–10 years old and 10–15 years old, as well as for firms with $100,000 – 250,000 and $250,000 – $500,000 in assets. To facilitate this analysis, we extend our baseline sample and look at all firms with less than $2 million in assets.[14]

[Table 5 – liabilities, investment and employment by firm age about here]

[Table 6 – liabilities, investment and employment by firm size about here]

Overall, the regression results presented in Tables 5 and 6 are consistent with the hypothesis that financial opacity declines with firm size and age. We find that the impact of house price changes decreases monotonically as a firms grow older (Table 5) or larger (Table 6).

Column 1 of Table 5 shows that, as firms get older, the effect of housing collateral on borrowing declines. This result holds for all countries in our sample. Column 1 of Table 6 shows that point estimates of the impact of residential collateral values on borrowing in Italy and Spain decrease by over 60% when one moves from firms with total assets of less than $100,000 to those with total assets of $100,000– 250,000.

Estimates in Columns 2 in Tables 5 and 6 confirm the declining importance of residential collateral for investment as firms grow in age and size, in particular in Italy and Spain. In France, these effects are clearer in investment than borrowing behaviour. In the United Kingdom, the size of coefficients also decreases for younger and smaller firms, but many estimates are statistically insignificant.

Estimates in Columns 3 of Tables 5 and 6 show the impact of increasing firm age and size on the relationship between housing collateral and firm employment. With this larger sample of firms used in the regression – including firms up to $2 million in total assets – we find a significant relationship between house prices and employment in all countries when looking at firm age and all but the UK when looking at size.

To further explore the importance of collateral for the three measures of financially constrained firms – size, age and external financing needs – we include all three definitions in a single regression. For this, we make use of the basic specification described in the main results above (i.e. focusing only on firms with less than $500.000 in total assets). The results are presented in Table 7. This specification addresses concerns that the individual regressions might simply capture different expressions of the same underlying phenomenon. This might be the case, for instance, if all small firms were also young. This "horserace" specification also allows us to compare the magnitude of coefficients against one another.

[Table 7 about here – horse race]

[14] In one specification, we extend our analysis to all SMEs, using $43 million in assets as a cutoff (Eurostat definition of SMEs). The results by and large do not change qualitatively compared with those in Tables 5 and 6.

We find that the size and significance of individual coefficients diminishes somewhat, though this is to be expected. Overall, each measure of financial constraint in France, Italy and Spain adds new information to the system. The measure of opacity that is most important for firm activity varies across countries. In Spain, the effect is most pronounced for small firms, in Italy for firms relying on external financing. In France, young firms are more likely to make use of rising collateral values than their older counterparts. In the United Kingdom, the already weak effects are rendered insignificant. It should perhaps be noted again that in this regression, as in the regressions above, the effect is most pronounced for southern European economies.

3.3 Robustness

3.3.1 Controlling for local demand

To ensure the robustness of our results, we control for local demand from house price changes by including *region*time* dummy variables, as well as aggregate industry-specific sales developments. In order to ensure that these controls are sufficient, and our results are measuring the collateral lending channel from local residential real estate (instead of the local demand effect observed in other papers), we split our sample in two different ways.

First, we split the sample into tradeable and non-tradeable industries as in Mian and Sufi (2012). They show that companies which operate in the "non-tradable" sectors rely on local demand and should therefore be more affected by changes in real estate prices. After all, the variation in house prices changes homeowner wealth and affects purchasing behaviour, to which companies with a local focus are then more exposed. We interact whether a firm is in a tradeable industry with house price changes and estimate the effect on our three outcome variables, using the full set of controls described above.

In Table 8, we find that the impact of changes in local house prices on firm borrowing and investment is greatest for firms in the tradable sector – if there is any difference at all. The only country where we observe a statistically significant difference is Spain. As the sign of the coefficient is positive, however, it implies that firms in tradable industries are possibly more affected by changing collateral values.

[Table 8 here – split by tradable vs. non-tradable sectors: results for liabilities, investment and employment].

We also conduct an alternative robustness test by subsampling our data, looking only at the "tradeable" sector and re-estimate our baseline regressions (Tables 2, 3 and 4). These regressions are reported in the Appendix as tables A2, A3 and A4. Our results are robust to a sample split along this dimension.

Second, our baseline specification assumes that opaque firms are not affected differently by consumer demand than their less opaque counterparts. It is possible that changes in regional income differentially affects consumer demand for goods and services of opaque firms. As a robustness test we also include annual changes in disposable income and the interaction of

changes in disposable income and firm opacity as control variables. Our baseline specifications (Tables 2, 3 and 4) are re-estimated and reported in the Appendix (Tables A5, A6 and A7). Overall, the majority of our results remain robust, with only the coefficient on young firm employment no longer being significant in France.

3.3.2 Compounded Opacity

We split the sample along the definition of external financing needs. Then we analyse whether opaque firms (i.e. younger and smaller firms) are more likely to make use of collateral in firm activities if they are in an industry that makes use of external financing to a greater degree. We argue that supply constraints should be more binding for firms with a greater need for external finance, which are also opaque. We find that this generally holds. Only in regressions dealing with employment is the effect unclear, sometimes going in the opposite direction. However, the difference between the two groups of firms is not statistically significant. We therefore argue that our estimates are indeed picking up a supply channel effect, especially in Italy and Spain, which can be compounded if both financial constraint conditions hold.

[Table 9 here – splits by high vs low external financing needs]

3.3.3 Controlling for firms' fixed assets

So far we have assumed that entrepreneurs use their own house as collateral. Chaney et al (2012) and Kleiner (2015) examined instead how the use of firms' own real estate collateral affected investment. Due to data limitations, Kleiner (2015) approximated the real estate collateral of small firms in the UK by total tangible fixed assets (fixed in an early year) interacted with residential house price changes. His assumption was, therefore, that the collateral lending channel should be stronger for firms with higher fixed assets.

However, there are also opposing forces that may result in a weaker relationship between housing collateral and firm fixed assets. Although banks may offer better terms on small business loans backed by housing collateral, it is still possible for small firms to obtain unsecured loans.[15] The chances of a firm obtaining an unsecured loan will depend on its credit score derived from bank internal rating systems that assess loan applicants. In most rating systems, any additional unpledged collateral of a firm raises the perceived quality of the applicant. Therefore, firms with high fixed assets may be offered relatively favourable terms on unsecured borrowing, and hence be less sensitive to fluctuations in the value of the firm's or owner's assets.

In Table 10, we split firms within respective industry-size groups into those with above- and below-median fixed assets as a share of total assets. Panels A and B present the effects of changing house prices interacted with firm size and age, i.e. dummies for whether a firm is at

[15] Using Basel II as a guide, banks face a risk weighting of 35% for loans secured with real estate. However, loans to unrated small business face a 75% capital risk weight. For larger firms, unsecured exposures are classified as corporate and receive a 100% risk weight if equivalent if the rating is at or above a BB-, and a 150% risk weight if the rating is lower. Even business loans secured with corporate real estate face a risk weight of 60%.

most 5 years old and has less than $100,000 in total assets. On average, we find that firms with high fixed assets are less sensitive to changes in the value of residential real estate. This difference is most pronounced for firms in Spain, while they are less clear for firms in Italy.

[Table 10 about here]

We further test the interplay of fixed assets and firm borrowing by including both sub-groups (firms with above- and below-median fixed assets) in the same regression and using a double-interaction term – the interaction between measures of financial opacity, house prices and high fixed assets – to gauge the magnitude of the difference.[16] The results are reported in Table 11. In all cases except one, firms with more fixed assets are less sensitive to house price fluctuations than those with fewer fixed assets. This observations holds independently of the way we split the sample (mean of fixed assets per size, age and industry; or at the 25th and 75th percentile). Only small UK firms seem different: those with high fixed assets are also more sensitive to fluctuations in the value of residential real estate.

[Table 11 about here]

3.3.4 Additional robustness tests

In an additional set of robustness tests, we assess the sensitivity of our results to the level at which variables are winsorized. As discussed above, year-on-year changes are winsorized at the 5% level. Winsorizing at the 1% level instead does not impact the significance or sign of our estimates. It does, in some instances, change the magnitude of our coefficients. Our strict winsorizing ostensibly places an additional burden on our identification. Firms with extremely high year-on-year growth can influence, to some degree, the shape and nature of the relationship between financial constraint and the propensity to make use of collateral. The significance of our estimates in the face of strict winsorizing suggests that our earlier results are robust.

As detailed in Section 2, our data cleaning procedure required more than two observations. We make use of alternate cleaning procedures, such as requiring all firms to still be active at the end of the sample in 2012, or alternatively, keeping all firms in our sample. The coefficients of our regressions are changed somewhat. However, the interpretations, especially the observation that house price changes are most important for opaque firms in Spain and Italy, remain completely unaltered.

We also included observations that were previously removed for having implausibly high firm leverage ratios (leverage ratios of more than 1.2), as described in section 2. We took these firms to have been erroneously coded. If we increase the cut-off leverage ratio to 1.5, our estimated coefficients increase in size in some cases, but do not change in terms of their significance.

[16] We include the interaction term “Firm opacity*real estate changes*high fixed assets” as well as “real estate changes*high fixed assets” in the basic regressions discussed in Table 2. “High fixed assets” is a binary variable that equals 1 if a firm has high fixed assets compared to its industry and size peers. “Firm opacity” is proxied by size or age.

As is evident in Figure 3, some regions in France experience very significant movements in residential house prices. We rerun our basic estimations, excluding the years or regions in question. The size, significance and magnitude of the coefficients remain largely unchanged. This is partly because the proportion of firms in outlying regions most affected by these price swings, relative to the remaining sample, is small, and the overall effect we observe is not driven by a few outliers.

As can be seen from the summary statistics, different specifications of our regressions make use of slightly different sample sizes. This becomes particularly evident when comparing sample sizes between regressions dealing with changes in borrowing as a dependent variable, and those dealing with changes in employment. Employment information is recorded for a much smaller set of firms in AMADEUS. This is an issue that applies particularly to small firms.

In a further robustness test we therefore restrict our samples to observations for which information on capital structure as well as employment is available. We find that the magnitude of the coefficients decreases somewhat. Unfortunately, firms that report less information to the official business registries are smaller and more opaque, i.e. precisely the firms for which the importance of housing collateral for borrowing is relatively large. Omitting such firms limits the power of our identification. But ultimately, this may only imply that we are underestimating the effect of changing house prices on employment in opaque firms in our baseline regression.

4. Conclusion

In this paper, we estimate the impact of financial constraints on firm structure and activity in small firms in Spain, Italy, France and the UK. We first posit that opaque firms must make use of collateral in order to alleviate credit constraints. Second, entrepreneurs or small business owners make use of housing equity as collateral when obtaining a firm credit. We identify a credit supply effect by measuring the changes in the activity or structure of an opaque firm relative to a comparable but more transparent firm in response to a change in the value of housing. We use three measures to identify a constrained firm: very small firms (vs. small but slightly larger firms), very young (vs. older) firms and firms active in industries that make greater use of external financing. We focus our analysis on small firms (less than $500.000 in assets) because local demand effects are more similar for such firms and the value of an average house may represent a large proportion of total assets. Moreover, as small firms make up a sizeable share of overall employment, especially in Europe, understanding developments that affect these firms is important from an aggregate perspective.

We show that the loosening of borrowing constraints from rising house prices translates into increased borrowing and investment for opaque relative to more transparent firms. Similar results also hold for firms more reliant on external financing. In addition, increasing collateral values help young firms increase employment. We thereby show that more opaque firms are severely constrained in their ability to grow or expand and substantially dependent on house price growth.

We show that these effects are more pronounced in Spain and Italy as opposed to France and the UK. This result confirms our prior. Home ownership rates and financial frictions, induced by the legal frameworks that govern recourse, loan enforcement and bankruptcy resolution, will influence the importance of collateral in facilitating growth of opaque firms.

As monetary policy can affect the value of collateral through the balance sheet channel, our estimates suggest that changes in policy rates could have a more pronounced effect on firm activity in some countries than in others. Our findings could have important implications for assessments of the heterogeneous transmission of monetary policy, especially across euro area economies.

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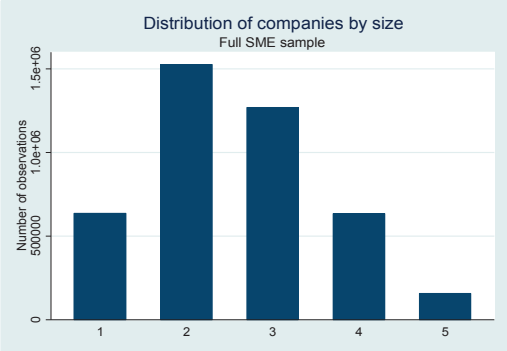
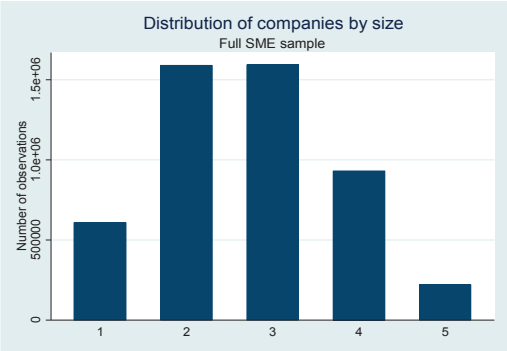
Figure 1 - Distribution of companies in full sample by size

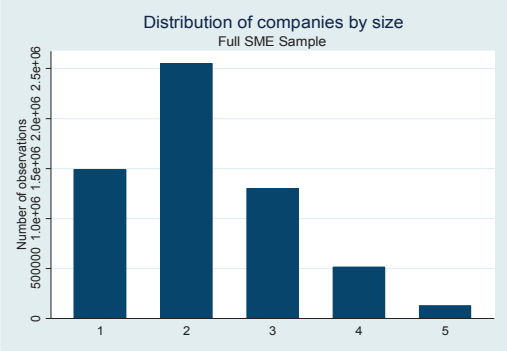
Spain



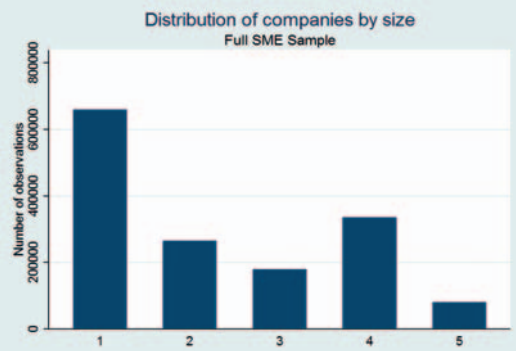
Italy



France



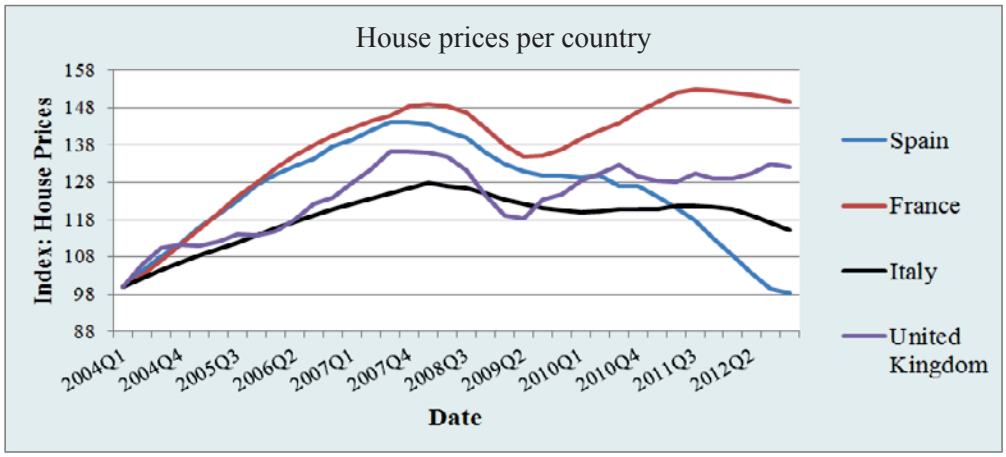
United Kingdom



This figure depicts the number of companies contained in each "size bin".
The data is drawn from our full smaple of SME firms (less than $43 million in assets), though this sample is used only in some analyses shown below.
Size categories:
1 = small firms with less than $100,000 in assets, 2 = $100,000-500,000 in assets,
3 = $500,000-2,000,000 in assets, 4 = $2-10 million in assets
5 = $10-43 million in assets

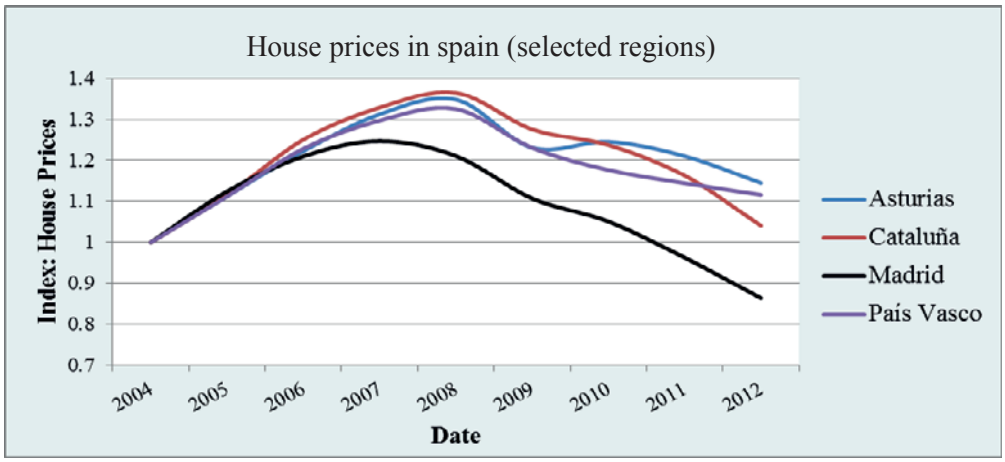
Figure 2 - House prices

Panel A - Countrywide indices for Italy, France and Spain



Panel A depicts house price developments for Italy, France and Spain at the country level. There are distinct differences in the development of prices among regions. Most notable is the prolonged decline in Spanish house prices

Panel B - House price indices for selected regions in Spain

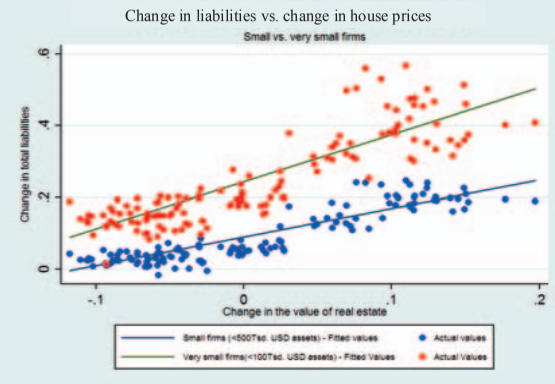


Panel B depicts house prices for four different Spanish regions. The figure highlights that, although prices trend in similar directions, some cross-sectional heterogeneity exists. The onset of the crisis occurs at different times for different regions, while some regions see price appreciation even during the crisis.

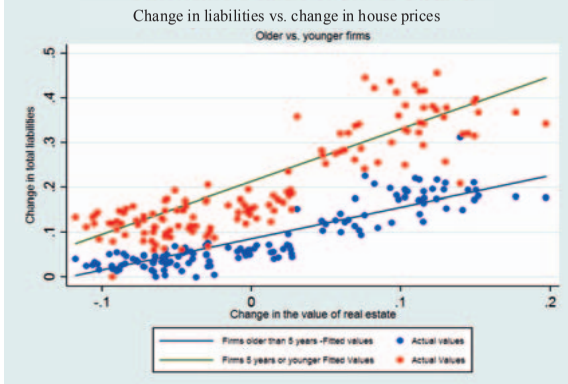
Figure 3 - Sensitivity of firm liabilities to house prices

Panel A - Spain

Split by size



Split by age



Split by reliance on external financing

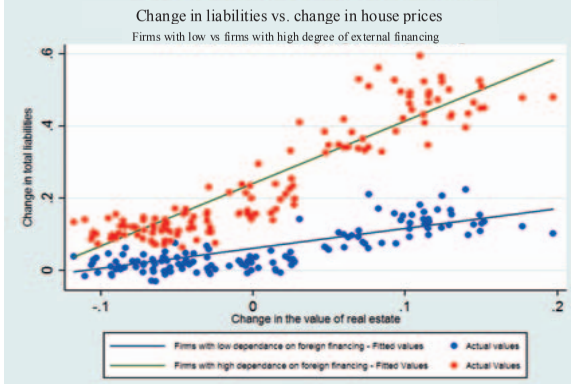
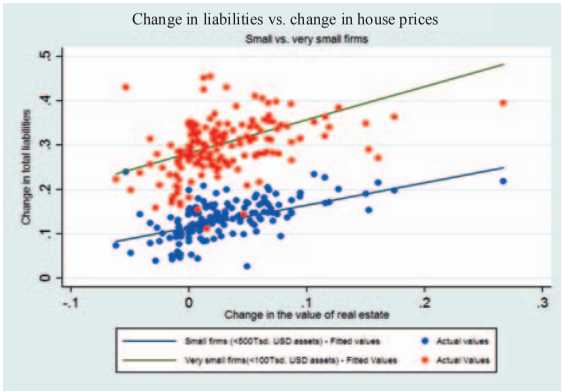


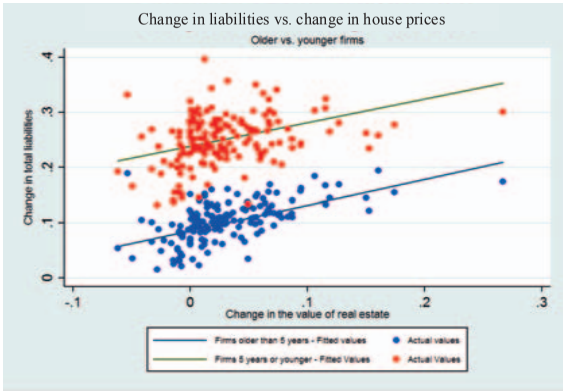
Figure 3 - Sensitivity of firm liabilities to house prices

Panel B - Italy

Split by size



Split by age



Split by reliance on external financing

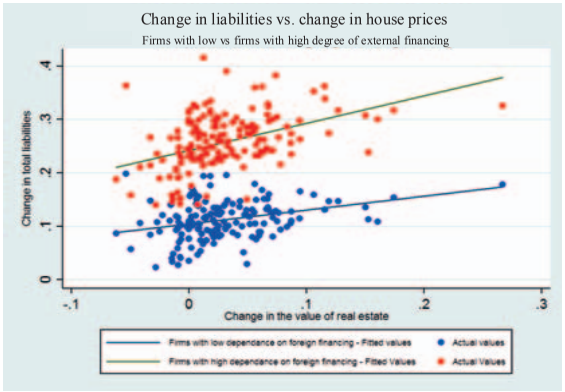
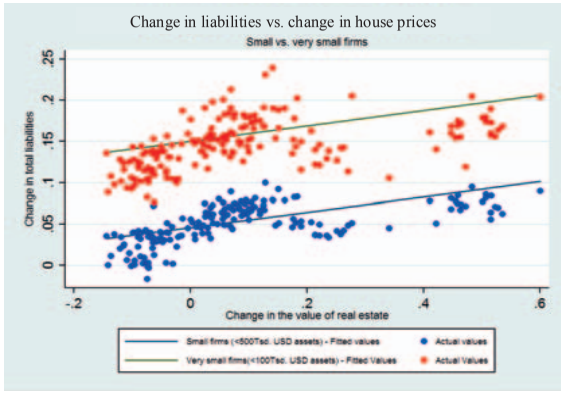


Figure 3 - Sensitivity of firm liabilities to house prices

Panel C - France

Split by size



Split by age

Split by reliance on external financing

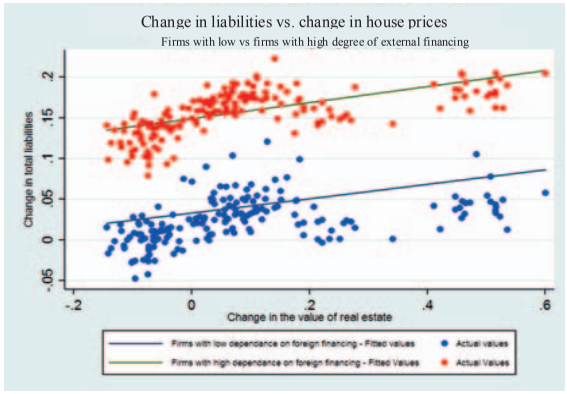
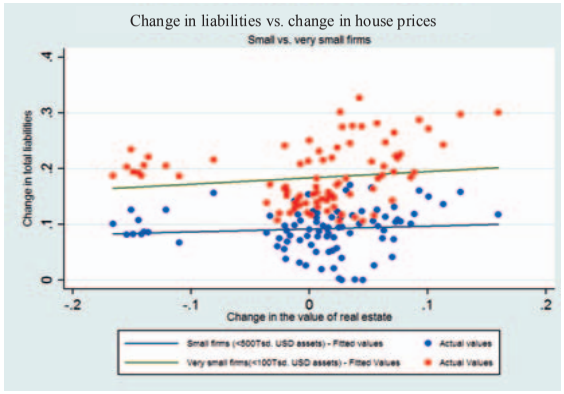


Figure 3 - Sensitivity of firm liabilities to house prices

Panel D - UK

Split by size



Split by age

Split by reliance on external financing

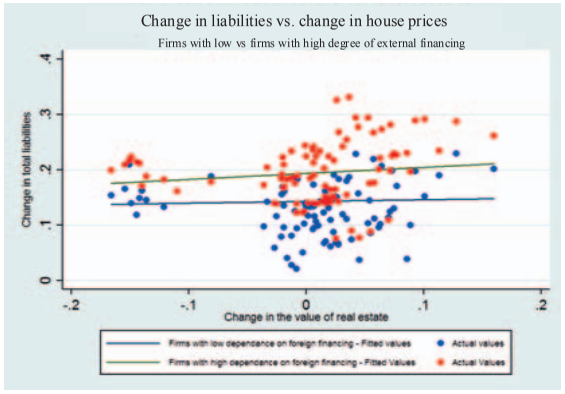


Table 1: Summary statistics

SPAIN

Variable	Mean	Standard deviation	Median	Number of observations
Total assets	205,778	131,329	183,912	987,927
Leverage (total liabilities / total assets)	0.6	0.3	0.7	987,927
Turnover	330,984	391,294	225,341	987,927
EBIT	10,103	31,163	5,826	987,927
Cash	34,409	46,685	17,072	987,927
Proportion of young firms (5 years or less)	0.3	0.5	-	987,927
Proportion of very small firms ($100.000 or less in assets)	0.3	0.4	-	987,927
Total liabilities	128,378	107,834	98,945	987,927
Investment (average per year)	14,973	152,871	1,683	858,160
Employees (number of)	5	11	3	800,839
Productivity (value added per employee)	27,783	23,468	22,934	800,839
Growth in liabilities	0.10	0.46	0.00	987,927
Investment (scaled to fixed assets in previous period	0.28	0.56	0.04	858,160
Growth of employment	0.03	0.29	-	800,839

ITALY

Variable	Mean	Standard deviation	Median	Number of observations
Total assets	2,143,918	131,013	194,471	1,066,618
Leverage (total liabilities / total assets)	0.7	0.3	0.8	1,066,618
Turnover	284,388	535,598	189,890	1,066,618
EBIT	14,661	35,191	9,858	1,066,618
Cash	28,694	41,893	13,044	1,066,618
Proportion of young firms (5 years or less)	0.43	0.49	-	1,066,618
Proportion of very small firms ($100.000 or less in assets)	0.24	0.43	-	1,066,618
Total liabilities	156,306	117,803	130,552	1,066,618
Investment (average per year)	16,235	167,452	2,245	991,937
Employees (number of)	5	232	3	275,735
Productivity (value added per employee)	31,892	28,744	27,075	275,735
Growth in liabilities	0.13	0.41	0.03	1,066,618
Investment (scaled to fixed assets in previous period	0.42	0.75	0.09	991,937
Employment growth	0.09	0.37	-	275,735

FRANCE

Variable	Mean	Standard deviation	Median	Number of observations
Total assets	182,121	125,894	151,319	1,881,877
Leverage (total liabilities / total assets)	0.6	0.2	0.6	1,881,877
Turnover	322,303	336,294	223,800	1,881,877
EBIT	18,753	38,710	11,022	1,881,877
Cash	46,824	58,474	25,363	1,881,877
Proportion of young firms (5 years or less)	0.40	0.50	-	1,881,877
Proportion of very small firms ($100.000 or less in assets)	0.33	0.47	-	1,881,877
Total liabilities	110,408	93,660	83,399	1,881,877
Investment (average per year)	11,016	74,593	1,699	1,745,757
Employees (number of)	4	13	3	562,120
Productivity (value added per employee)	46,212	35,642	37,148	562,120
Growth in liabilities	0.07	0.40 -	0.01	1,881,877
Investment (scaled to fixed assets in previous period	0.32	0.59	0.05	1,745,757
Employment growth	0.05	0.24	-	562,120

UNITED KINGDOM

Variable	Mean	Standard deviation	Median	Number of observations
Total assets	85,984	109,608	37,571	282,999
Leverage (total liabilities / total assets)	0.5	0.3	0.4	282,999
Turnover	155,793	472,070	51,561	282,999
EBIT	20,848	302,818	6,323	282,999
Cash	30,783	52,483	10,377	282,999
Proportion of young firms (5 years or less)	0.34	0.47	-	282,999
Proportion of very small firms ($100.000 or less in assets)	0.71	0.45	1.00	282,999
Total liabilities	44,799	75,602	13,770	282,999
Investment (average per year)	5,017	37,698	<500	161,995
Employees (number of)	5	4	3	21,324
Productivity (value added per employee)	28,427	34,094	21,029	21,324
Growth in liabilities	0.14	0.61	0.01	282,999
Investment (scaled to fixed assets in previous period	0.39	0.76	0.02	161,995
Employment growth	0.01	0.14	-	21,324

This table depicts summary characteristics for the variables used in the regression. The information is represented for all the years available in the sample. Dependent variables are shown in both levels and changes. Additional controls, such as industry, time or region dummies are omitted for brevity. Sample sizes for regressions dealing with balance sheet items, such as liabilities or investment are consistently large across countires. Information on employment, however, varies strongly given differing reporting standards. The data has been cleaned as descibed.

Table 2: Impact of changes in house prices on liabilities in financially constrained firms

Dependent variable: Change in liabilities	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.847*** [16.42] *0.57*	0.555*** [7.10] *0.37*	0.164** [2.47] *0.11*
Italy	0.784*** [22.19] *0.39*	0.265*** [6.73] *0.13*	0.227** [3.53] *0.11*
France	0.0556*** [5.07] *0.03*	0.0612*** [6.12] *0.04*	-0.00594 [-0.98] *0.00*
United Kingdom	0.139*** [4.72] *0.03*	0.0140 [0.53] *0.00*	0.0835 [1.37] *0.02*
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*" percentage change in house prices" on percentage change in liabilities. Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions. Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.

Table 3: Impact of changes in house prices on investment in financially constrained firms

Dependent variable: Investment	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.933*** [8.37] *0.34*	0.688*** [7.51] *0.25*	-0.130 [-0.87] *-0.04*
Italy	0.765*** [22.17] *0.13*	0.449*** [9.08] *0.08*	1.030*** [5.61] *0.18*
France	0.0702*** [5.96] *0.02*	0.0677*** [6.02] *0.02*	0.00983 [0.52] *0.00*
United Kingdom	0.131** [2.45] *0.01*	0.0364 [1.58] *0.00*	0.0601 [0.66] *0.00*
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"percentage change in house prices" on investment.
Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions. Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.

Table 4: Impact of changes in house prices on changes in employment in financially constrained firms

Dependent variable: Change in employment	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.0469*** [4.62] *0.01*	0.274*** [9.51] *0.07*	0.0787*** [5.91] *0.02*
Italy	0.0573 [0.93] *0.01*	0.516*** [16.56] *0.08*	0.157*** [3.34] *0.02*
France	0.00314 [0.66] *0.00*	0.0136*** [3.33] *0.00*	0.00699 [1.02] *0.00*
United Kingdom	0.0146 [0.39] *0.00*	-0.0350 [-0.93] *-0.01*	0.0394 [0.65] *0.01*
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"percentage change in house prices" on percentage change in employment.
Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions. Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $10,000 change in the value of housing collateral on the dependent variable, expressed in number of employees, is reported in italics.

Table 5: Impact of changes in house prices on sucessively more financially constrained firms

		(1)	(2)	(3)
		Interaction of "change in house prices" and "age"		
		Change in liabilities	Investment	Change in employment
Spain	<5 years old	0.547*** [6.95] *0.366*	0.853*** [9.49] *0.315*	0.301*** [9.81] *0.073*
	5 to 10 years old	0.105*** [4.06] *0.068*	0.242*** [7.57] *0.089*	0.116*** [13.54] *0.027*
	10 to 15 years old	0.0538*** [3.22] *0.034*	0.144*** [6.96] *0.052*	0.0609*** [5.07] *0.015*
Italy	<5 years old	0.216*** [4.49] *0.104*	0.260*** [7.46] *0.045*	0.432*** [9.61] *0.070*
	5 to 10 years old	0.0562*** [3.34] *0.025*	-0.0972** [-2.81] *0.000*	0.0815** [2.43] *0.013*
	10 to 15 years old	0.0105 [0.35]	-0.136*** [-3.16] *-0.017*	0.0333 [1.67]
France	<5 years old	0.0368** [2.47] *0.020*	0.0878*** [8.03] *0.019*	0.0219*** [5.71] *0.005*
	5 to 10 years old	0.0129 [1.28]	0.0520*** [8.20] *0.012*	0.00958* [2.07] *0.002*
	10 to 15 years old	-0.00958 [-1.57]	0.0171*** [2.74] *0.002*	0.00651 [1.62]
United Kingdom	<5 years old	0.0717* [2.06] *0.015*	0.101*** [4.53] *0.006*	0.0377*** [3.45] *0.009*
	5 to 10 years old	0.0477 [1.09]	0.0891*** [3.63] *0.005*	0.00923 [0.39]
	10 to 15 years old	0.0540 [1.32]	0.0370 [1.01]	0.0114 [0.67]
Regressions include:				
Firm level controls		Yes	Yes	Yes
Industry dummies				
Region*time dummies				
Estimation technique		OLS	OLS	OLS

The above regressions are performed on all firms with $2 million or less in assets. We proxy opacity (the propensity to be financialy constrained) using the dummies that account for successively larger or older firms. As such, we extend eth regression specified for the tables above by including additional interaction terms.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 6: Impact of changes in house prices on sucessively more financially constrained firms

		(1)	(2)	(3)
		Interaction of "change in house prices" and "size"		
	Dependent variable:	Change in	Investment	Change in employment
Spain	< $100,000 in assets	0.730***	1.155***	0.0935***
		[9.15]	[7.46]	[3.38]
		0.495	*0.426*	*0.022*
	$100,000 to $250,000 in assets	0.198***	0.589***	0.0832***
		[3.81]	[7.25]	[3.14]
		0.129	*0.215*	*0.020*
	$250,000 to $500,000 in assets	0.0318	0.277***	0.0807***
		[1.31]	[5.93]	[5.23]
			0.100	*0.020*
Italy	< $100,000 in assets	0.539***	0.578***	-0.0343
		[11.94]	[7.43]	[-0.37]
		0.263	*0.099*	
	$100,000 to $250,000 in assets	0.150***	0.224*	-0.0241
		[4.01]	[2.05]	[-0.33]
		0.074	*0.038*	
	$250,000 to $500,000 in assets	0.0769**	0.139*	-0.0399
		[2.79]	[2.08]	[-0.70]
		0.035	*0.023*	
France	< $100,000 in assets	0.00285	0.0681**	0.00798
		[0.18]	[2.98]	[1.09]
	$100,000 to $250,000 in assets	-0.0119	0.0458***	0.0133*
		[-0.96]	[3.91]	[1.97]
	$250,000 to $500,000 in assets	-0.0120	0.0226*	0.0103
		[-1.14]	[1.85]	[1.64]
United Kingdom	< $100,000 in assets	0.0725	0.0424	-0.0455*
		[1.43]	[0.75]	[-1.93]
				-0.010
	$100,000 to $250,000 in assets	0.00624	-0.0282	-0.0461
		[0.18]	[-0.50]	[-1.51]
	$250,000 to $500,000 in assets	0.0122	-0.000101	-0.0226
		[0.33]	[-0.00]	[-0.52]
Regressions include:				
Firm level controls		Yes	Yes	Yes
Industry dummies				
Region*time dummies				
Estimation technique		OLS	OLS	OLS

The above regressions are performed on all firms with $2 million or less in assets. We proxy opacity using the dummies that account for successively larger firms. As such, we extend the regression specified for the tables above by including additional interaction terms.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 7: All variables in a single regression ("Horserace")

		(1)	(2)	(3)
		Interaction of "change in house prices" and "age"		
		Change in liabilities	Investment	Change in employment
Spain	**Interaction:** Change in house prices* Industry with high external financing dependence	0.170**	-0.184	0.0842***
		[2.30]	[-1.16]	[7.08]
		0.115		*0.020*
	Interaction: Change in the value of house prices* Young firm (less than 5 yrs)	0.311***	0.206**	0.171***
		[3.91]	[2.92]	[4.99]
		0.210	*0.074*	*0.042*
	Interaction: Change in house prices* Smallest Firm (100 Tsd. USD)	0.434***	0.195**	-0.00773
		[6.57]	[2.19]	[-0.47]
		0.292	*0.070*	
Italy	**Interaction:** Change in house prices* Industry with high external financing dependence	0.295***	1.235***	0.206***
		[3.50]	[6.57]	[5.27]
		0.144	*0.214*	*0.032*
	Interaction: Change in house prices* Young firm (less than 5 yrs)	0.0201	0.0467	0.380***
		[0.36]	[0.53]	[5.87]
				0.062
	Interaction: Change in house prices* Smallest Firm (100 Tsd. USD)	0.186***	-0.0646	-0.0172
		[5.87]	[-1.05]	[-0.25]
		0.089		
France	**Interaction:** Change in house prices* Industry with high external financing dependence	-0.0186	-0.0280	0.00593
		[-1.00]	[-0.81]	[0.67]
	Interaction: Change in house prices* Young firm (less than 5 yrs)	0.0348**	0.0243*	0.0197
		[2.21]	[2.10]	[1.75]
		0.023	*0.005*	
	Interaction: Change in house prices* Smallest Firm (100 Tsd. USD)	0.0149	0.0214	-0.0171
		[0.86]	[1.20]	[-1.36]
United Kingdom	**Interaction:** Change in house prices* Industry with high external financing dependence	0.0839	0.0660	0.0591
		[1.34]	[0.61]	[1.02]
	Interaction: Change in house prices* Young firm (less than 5 yrs)	-0.0822	0.0495	-0.00897
		[-1.12]	[0.74]	[-0.15]
	Interaction: Change in house prices* Smallest Firm (100 Tsd. USD)	0.0597	-0.0642	-0.00673
		[1.33]	[-1.05]	[-0.16]
Regressions include:				
Firm level controls		Yes	Yes	Yes
Industry dummies				
Region*time dummies				
Estimation technique		OLS	OLS	OLS

The above regressions are performed on all firms with $2 million or less in assets. We proxy opacity (the propensity to be financialy constrained) using dummies that account for successively larger or older firms. As such, we extend eth regression specified for the tables above by including additional interaction terms.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 8: Tradable vs. non-tradable industries

	(1)	(2)	(3)
	Interaction of "change in house prices" and "tradable indusrty"		
	Change in liabilities	Investment	Change in employment
Spain	0.290 [1.80]	0.427** [3.36] *0.155*	0.120*** [4.00] *0.029*
Italy	0.220 [1.06]	0.0423 [0.19]	-0.0668 [-0.50]
France	0.0449* [2.29]	-0.00151 [-0.08] *0.000*	0.0165 [1.02]
United Kingdom	0.0209 [0.48]	0.0982 [1.26]	0.0185 [1.01]
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction-term tradable industry*percentage change in house prices on dependent variables: change in liabilities, investment and change in employees.

Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.

The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.

The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 9: Companies with high external financing vs. low external financing

Panel A - Interactions of "Change in house prices" and "Small companies"

	(1)	(2)	(3)	(4)	(5)	(6)
	Companies with **high** degree of **external financing**			Companies with a **low** degree of **external financing**		
	Change in liabilities	Investment	Change in employment	Change in Liabilities	Investment	Change in employment
Spain	0.947***	0.829**	0.0671**	0.560***	0.195***	0.0601***
	[5.67]	[2.54]	[2.87]	[8.62]	[5.57]	[3.69]
	0.638	*0.303*	*0.015*	*0.380*	*0.070*	*0.015*
Italy	0.788***	0.641***	0.0576	0.516***	0.0880***	0.227**
	[10.08]	[5.61]	[0.53]	[7.86]	[4.08]	[2.94]
	0.387	*0.111*		*0.253*	*0.014*	*0.037*
France	0.0644***	0.0758**	0.0157*	0.0579***	0.0309***	0.00227
	[3.47]	[2.75]	[1.95]	[4.43]	[5.61]	[0.31]
	0.042	*0.018*	*0.003*	*0.038*	*0.007*	
United Kingdom	0.122	-0.0292	0.000996	0.0470	0.0315	-0.0216
	[1.16]	[-0.21]	[0.02]	[0.83]	[0.48]	[-0.28]
Regressions include:						
Firm level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies						
Region*time dummies						
Estimation technique	OLS	OLS	OLS	OLS	OLS	OLS

Panel B - Interactions of "Change in house prices" and "Young companies"

	(1)	(2)	(3)	(4)	(5)	(6)
	Companies with **high** degree of **external financing**			Companies with a **low** degree of **external financing**		
	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment
Spain	0.659***	0.445**	0.289***	0.335***	0.136**	0.211***
	[5.13]	[2.52]	[7.43]	[4.57]	[2.72]	[12.32]
	0.441	*0.163*	*0.068*	*0.224*	*0.048*	*0.051*
Italy	0.314***	0.553***	0.498***	0.159***	0.0584*	0.509***
	[7.13]	[3.69]	[8.50]	[3.48]	[1.83]	[10.40]
	0.154	*0.096*	*0.079*	*0.074*	*0.010*	*0.081*
France	0.0594***	0.0567***	0.0118	0.0416***	0.0121*	0.0126
	[10.05]	[4.30]	[1.28]	[3.31]	0.947***	[1.61]
	0.039	*0.014*		*0.027*	*0.003*	
United Kingdom	-0.116	-0.0147	-0.0739	-0.0539	0.0168	0.0108
	[-0.89]	[-0.11]	[-0.80]	[-0.52]	[0.25]	[0.14]
Regressions include:						
Firm level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies						
Region*time dummies						
Estimation technique	OLS	OLS	OLS	OLS	OLS	OLS

This table presents the same basic regressions as Table 2. In this case, the regressions are split into subsamples by whether the company makes use of a high degree of external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 10: Companies with high and low fixed assets

Panel A - Interactions of "Change in house prices" and "Small companies"

	(1)	(2)	(3)	(4)	(5)	(6)
	Companies with **high fixed assets**			Companies with **low fixed assets**		
	Change in liabilities	Investment	Change in employment	Change in Liabilities	Investment	Change in employment
Spain	0.831***	0.780***	0.0683***	0.837***	0.885***	0.0352***
	[14.86]	[10.63]	[3.40]	[17.08]	[8.43]	[6.96]
	0.5629	*0.2887*	*0.0147*	*0.5629*	*0.3257*	*0.0073*
Italy	0.853***	0.474***	-0.0220	0.742***	0.890***	0.103*
	[14.42]	[10.56]	[-0.19]	[18.33]	[7.24]	[1.89]
	0.4216	*0.0817*		*0.3680*	*0.1547*	*0.0167*
France	0.0300*	-0.00485	-0.00771	0.0664***	0.114***	0.0119*
	[1.95]	[-0.33]	[-0.97]	[6.97]	[7.03]	[2.01]
	0.0197			*0.0327*	*0.0277*	*0.0025*
United Kingdom	0.0673*	0.0513	-0.00885	0.182***	0.191**	0.0247
	[1.88]	[1.05]	[-0.23]	[4.72]	[2.54]	[0.62]
	0.0144			*0.0903*	*0.0114*	
Regressions include:						
Firm level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies						
Region*time dummies						
Estimation technique	OLS	OLS	OLS	OLS	OLS	OLS

Panel B - Interactions of "Change in house prices" and "Young companies"

	(1)	(2)	(3)	(4)	(5)	(6)
	Companies with **high fixed assets**			Companies with **low fixed assets**		
	Change in Liabilities	Investment	Change in employment	Change in Liabilities	Investment	Change in employment
Spain	0.479***	0.462***	0.296***	0.630***	0.924***	0.257***
	[7.12]	[6.99]	[12.98]	[30.84]	[6.84]	[6.98]
	0.3188	*0.1702*	*0.0709*	*0.4273*	*0.3405*	*0.0611*
Italy	0.297***	0.207***	0.538***	0.236***	0.587***	0.498***
	[6.56]	[4.24]	[12.41]	[10.07]	[10.19]	[12.91]
	0.1438	*0.0348*	*0.0872*	*0.1171*	*0.1008*	*0.0807*
France	0.0533***	0.0493***	0.0121**	0.0660***	0.0773***	0.0110**
	[4.23]	[10.28]	[2.33]	[12.45]	[4.05]	[2.81]
	0.0328	*0.0119*	*0.0026*	*0.0327*	*0.0187*	*0.0023*
United Kingdom	0.0243	0.0194	-0.0695	0.00982	0.0539	-0.0193
	[0.66]	[0.76]	[-1.20]	[0.25]	[1.15]	[-0.60]
Regressions include:						
Firm level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies						
Region*time dummies						
Estimation technique	OLS	OLS	OLS	OLS	OLS	OLS

This table separates the regression based on opacity by whether a company has a high ratio of fixed assets to total assets, vs the mean of its industry and region for all small firms.
Panel A shows the regression coefficients for the interaction of shanges in house prices and firm size, and Panel B for the interaction of changes in house prices and firm age.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Table 11: Double interaction term regressions for "High fixed assets" vs "Low fixed assets"

Panel A - Interactions of "Change in house prices", "Small companies" and "High fixed assets"

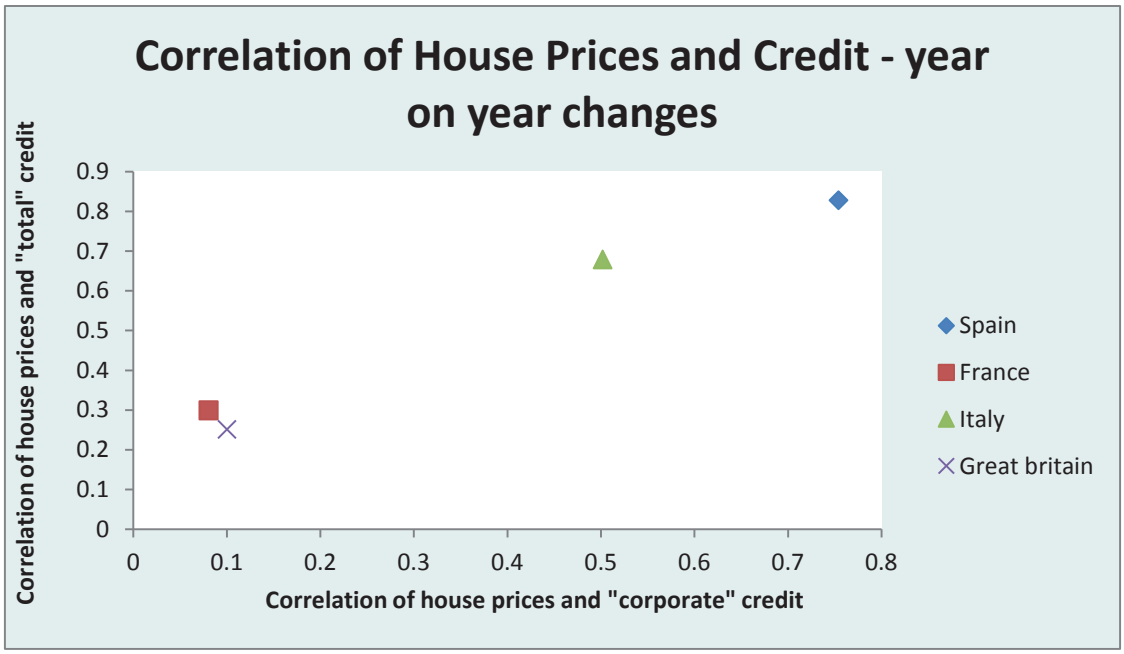
	Change in liabilities	Investment	Change in employment
Spain	-0.0383*** [-9.67] *-0.026*	-0.000291 [-0.21]	-0.00970 [-1.30]
Italy	-0.00175 [-0.20]	-0.00581* [-1.79]	0.00935 [1.06]
France	-0.0284*** [-3.92] *-0.018*	-0.00860 [-0.63]	0.00446 [1.68]
United Kingdom	-0.00777 [-1.03]	0.0841*** [6.12] *0.005*	-0.000894 [-0.29]
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

Panel B - Interactions of "Change in house prices", "Young companies" and "High fixed assets"

	Change in liabilities	Investment	Change in employment
Spain	-0.0525*** [-10.09] *-0.035*	-0.00865*** [-3.60] *-0.003*	-0.116*** [-11.26] *-0.027*
Italy	-0.0361*** [-3.40] *-0.018*	-0.00741*** [-4.23] *-0.001*	-0.130*** [-9.14] *-0.016*
France	-0.0535*** [-5.83] *-0.035*	-0.116*** [-13.89] *-0.028*	-0.0196*** [-7.90] *-0.002*
United Kingdom	-0.0271** [-2.70] *-0.006*	-0.0896*** [-8.36] *-0.005*	-0.00418 [-0.69] -
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table separates the regression based on opacity by whether a company has a high ratio of fixed assets to total assets, vs the mean of its industry and region, for all small firms. Panel A shows the regression coefficients for firms with high and Panel B for firms with low fixed assets. Overall, firms with high fixed assets show a less pronounced reaction to changes in the value of house prices. Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on liabilities and investment, expressed in dollars, is reported in italics.
The effect of a $10,000 change in the value of housing collateral on employment is reported in italics.

Appendix Figure A1 - Correlation of changes in house prices and credit



The figure shows correlations between year-on-year changes in house prices and corporate credit (horizontal axis) and changes in house prices and total credit (vertical axis).
Both are much higher in southern Europe (Italy and Spain) than in France or the United Kingdom.
Source: BIS.

Appendix Table A1 - Full regressions (basic specification)

SPAIN

	Size			Age			Dependence on external financing		
	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment
Interaction: Change in house prices* Financially constrained	0.847***	0.933***	0.0469***	0.555***	0.688***	0.274***	0.164**	-0.130	0.0787***
	[16.42]	[8.37]	[4.62]	[7.10]	[7.51]	[9.51]	[2.47]	[-0.87]	[5.91]
Leverage	-0.245***	-0.0868***	0.0225***	-0.246***	-0.0880***	0.0222***	-0.239***	-0.103***	0.0130***
	[-15.04]	[-6.44]	[9.23]	[-14.64]	[-6.22]	[9.13]	[-11.74]	[-13.34]	[4.20]
Cash to turnover (at beginning of	-0.0143***	0.0432***	0.0203***	-0.0146***	0.0428***	0.0204***	-0.0184***	0.0206**	0.0214***
	[-3.92]	[3.39]	[4.73]	[-4.08]	[3.32]	[4.78]	[-4.34]	[2.55]	[6.86]
EBIT to turnover (at beginning of	-0.0547***	0.0116	0.0396***	-0.0540***	0.0125	0.0400***	-0.0718***	-0.00302	0.0398***
	[-6.96]	[0.80]	[6.43]	[-7.03]	[0.85]	[6.45]	[-6.42]	[-0.50]	[6.94]
Industry region sales	0.00515**	0.00323	0.00106	0.00513**	0.00307	0.000929	0.00710*	-0.000517	-0.000608
	[2.17]	[1.05]	[0.51]	[2.30]	[1.00]	[0.45]	[2.04]	[-0.48]	[-0.26]
Log of turnover	0.00317*	0.0517***	-0.00531*	0.00337*	0.0520***	-0.00484	0.00317*	0.0517***	-0.00531*
	[1.79]	[13.88]	[-1.78]	[1.90]	[14.53]	[-1.65]	[1.79]	[13.88]	[-1.78]
Constant	1.244***	-0.290***	1.089***	0.875***	-0.278***	1.102***	1.126***	-0.118***	1.164***
	[31.40]	[-6.79]	[28.00]	[24.15]	[-7.74]	[27.19]	[25.78]	[-3.34]	[31.12]
Region*Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size, age, financing dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	987927	858160	800839	987927	858160	800839	350010	348584	292956
adj. R-sq	0.074	0.078	0.042	0.072	0.077	0.043	0.058	0.043	0.040

ITALY

	Size			Age			Dependence on external financing		
	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment
Interaction:									
Change in house prices*									
Financially constrained	0.784***	0.765***	0.0573	0.265***	0.449***	0.516***	0.227**	1.030***	0.157***
	[22.19]	[22.17]	[0.93]	[6.73]	[9.08]	[16.56]	[2.68]	[5.61]	[3.34]
Leverage	-0.237***	-0.0813***	-0.0172***	-0.236***	-0.0804***	-0.0173***	-0.249***	-0.0843***	-0.0176***
	[-21.35]	[-6.91]	[-3.25]	[-21.32]	[-6.82]	[-3.31]	[-20.15]	[-5.98]	[-3.40]
Cash to turnover (at beginning of	-0.00188*	0.0336***	0.00564***	-0.00182*	0.0337***	0.00553**	-0.000126	0.0325***	0.00438**
	[-1.95]	[6.93]	[3.03]	[-1.90]	[6.93]	[2.99]	[-0.08]	[6.87]	[2.62]
EBIT to turnover (at beginning of	-0.0109***	0.00408	0.0112***	-0.0109***	0.00401	0.0111***	-0.0119***	0.0101**	0.0104***
	[-9.31]	[0.65]	[6.78]	[-9.08]	[0.64]	[6.70]	[-10.68]	[2.36]	[3.67]
Industry region sales	0.00123	0.00278**	0.00213	0.00127*	0.00281**	0.00208	0.000439	0.00295**	0.00156
	[1.74]	[2.95]	[1.29]	[1.85]	[2.97]	[1.27]	[0.42]	[2.44]	[0.88]
Log of turnover	0.00701***	0.0618***	-0.00628	0.00751***	0.0623***	-0.00608	0.00701***	0.0618***	-0.00628
	[3.96]	[11.35]	[-1.24]	[4.15]	[11.68]	[-1.20]	[3.96]	[11.35]	[-1.24]
Constant	1.213***	-0.420***	1.166***	1.205***	-0.369***	1.142***	1.251***	-0.0582	1.234***
	[72.11]	[-7.25]	[12.82]	[70.78]	[-6.23]	[12.43]	[54.40]	[-0.69]	[10.91]
Region*Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size, age, financing dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1066618	991937	275735	1066618	991937	275735	430992	427755	120811
adj. R-sq	0.071	0.039	0.016	0.071	0.038	0.017	0.078	0.085	0.015

FRANCE

	Size			Age			Dependence on external financing		
	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment
Interaction:									
Change in house prices*									
Financially constrained	0.0556***	0.0702***	0.00314	0.0612***	0.0677***	0.0136***	-0.00594	0.00983	0.00699
	[5.07]	[5.96]	[0.66]	[6.12]	[6.02]	[3.33]	[-0.53]	[0.52]	[1.02]
Leverage	-0.303***	-0.151***	0.00609*	-0.303***	-0.152***	0.00615*	-0.308***	-0.141***	0.00191
	[-20.00]	[-9.71]	[1.90]	[-19.97]	[-9.74]	[1.92]	[-16.21]	[-8.95]	[0.53]
Cash to turnover (at beginning of	-0.0105**	0.0508***	0.0170***	-0.0105**	0.0508***	0.0170***	-0.00773	0.0500***	0.0208***
	[-3.01]	[5.12]	[4.45]	[-3.00]	[5.12]	[4.45]	[-1.45]	[4.24]	[7.22]
EBIT to turnover (at beginning of	-0.0607***	0.0255	0.0563***	-0.0606***	0.0256	0.0563***	-0.0653***	0.0233	0.0553***
	[-12.77]	[1.49]	[6.58]	[-12.75]	[1.49]	[6.58]	[-14.03]	[1.51]	[9.10]
Industry region sales	0.00152	-0.00422***	0.00175***	0.00147	-0.00428***	0.00173***	0.00171	-0.00193	0.00190*
	[1.61]	[-5.30]	[3.57]	[1.55]	[-5.24]	[3.58]	[1.22]	[-1.03]	[2.16]
Log of turnover	0.0149***	0.0668***	-0.00273	0.0149***	0.0669***	-0.00273	0.0149***	0.0668***	-0.00273
	[5.64]	[21.49]	[-1.36]	[5.68]	[21.53]	[-1.37]	[5.64]	[21.49]	[-1.36]
Constant	1.025***	-0.368***	1.046***	1.023***	-0.370***	1.044***	1.052***	-0.151*	1.093***
	[23.61]	[-10.99]	[38.70]	[23.68]	[-11.24]	[38.25]	[17.29]	[-1.81]	[40.28]
Region*Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size, age, financing dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1882877	1745757	562120	1882877	1745757	562120	741293	733605	224142
adj. R-sq	0.061	0.052	0.019	0.061	0.052	0.019	0.072	0.080	0.017

UNITED KINGDOM

	Size			Age			Dependence on external financing		
	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment	Change in liabilities	Investment	Change in employment
Interaction:									
Change in house prices*									
Financially constrained	0.139***	0.131**	0.0146	0.0140	0.0364	-0.0350	0.0835	0.0601	0.0394
	[4.72]	[2.45]	[0.39]	[0.53]	[1.58]	[-0.93]	[1.37]	[0.66]	[0.65]
Leverage	-0.282***	-0.0508***	0.000579	-0.282***	-0.0510***	0.000576	-0.332***	-0.0594***	0.0140
	[-15.70]	[-4.80]	[0.18]	[-15.67]	[-4.81]	[0.18]	[-28.25]	[-3.85]	[1.66]
Cash to turnover (at beginning of	-0.00731***	0.0145***	0.00105**	-0.00731***	0.0145***	0.00105**	-0.0147***	0.0268***	0.00186
	[-3.33]	[15.95]	[2.39]	[-3.33]	[15.94]	[2.40]	[-3.62]	[5.59]	[0.87]
EBIT to turnover (at beginning of	-0.0205***	0.00637	-0.000494	-0.0205***	0.00637	-0.000491	-0.0266**	0.0424***	0.00179
	[-3.29]	[1.17]	[-0.76]	[-3.29]	[1.17]	[-0.76]	[-2.95]	[3.47]	[1.22]
Industry region sales	0.00479	-0.000169	-0.000827	0.00487	-0.0000823	-0.000804	0.00616	0.00315	-0.000230
	[1.17]	[-0.05]	[-0.57]	[1.18]	[-0.03]	[-0.55]	[1.13]	[0.66]	[-0.06]
Log of turnover	0.00476	0.0575***	0.00450***	0.00475	0.0575***	0.00450***	0.00476	0.0575***	0.00450***
	[0.79]	[14.96]	[5.01]	[0.79]	[14.93]	[5.01]	[0.79]	[14.96]	[5.01]
Constant	1.203***	-0.379***	0.940***	1.202***	-0.379***	0.940***	1.698***	-0.121	0.986***
	[14.40]	[-4.72]	[55.84]	[14.41]	[-4.72]	[55.76]	[12.51]	[-0.73]	[29.72]
Region*Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size, age, financing dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	282999	161995	21324	282999	161995	21324	51510	50084	5079
adj. R-sq	0.038	0.028	0.011	0.038	0.028	0.011	0.061	0.074	0.018

Table A2: Impact of changes in house prices on liabilities in financially constrained firms

Estimations performed only on firms in "tradable" sector

Dependent variable: Change in liabilities	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"
Spain	0.881** [7.38] *0.60*	0.556** [4.73] *0.37*
Italy	0.886*** [13.48] *0.44*	0.190* [3.21] *0.09*
France	0.0827** [8.52] *0.05*	0.0717** [7.73] *0.05*
United Kingdom	0.175*** [11.54] *0.04*	0.0443 [1.17] *0.01*
Regressions include:		
Firm level controls	Yes	Yes
Industry dummies		
Region*time dummies		
Estimation technique	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on liabilities.
Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions.These estimations are performed only on a subsample of "tradeable" firms.
Financial constraint is proxied in three different ways: very small firms ($100,000 in assets) and very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.
Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

Table A3: Impact of changes in house prices on investment in financially constrained firms

Estimations performed only on firms in "tradable" sector

Dependent variable: Investment	(1)	(2)
	Interaction of "change in house prices" and "size"	Interaction of "change in house prices" and "age"
Spain	0.0528** [6.58] *0.01*	0.268** [5.81] *0.06*
Italy	0.0556 [0.52] *0.01*	0.549*** [10.20] *0.09*
France	0.0171 [1.32] *0.00*	0.00678 [0.65] *0.00*
United Kingdom	0.0567 [1.35] *0.01*	-0.0811 [-1.03] *-0.02*
Regressions include:		
Firm level controls	Yes	Yes
Industry dummies		
Region*time dummies		
Estimation technique	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on investment.
Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions.These estimations are performed only on a subsample of "tradeable" firms.
Financial constraint is proxied in three different ways: very small firms ($100,000 in assets) and very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.
Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

Table A4: Impact of changes in house prices on changes in employment in financially constrained firms

Estimations performed only on firms in "tradable" sector

Dependent variable: Change in employment	(1)	(2)
	Interaction of "change in house prices" and "size"	Interaction of "change in house prices" and "age"
Spain	0.0469*** [4.62] *0.01*	0.274*** [9.51] *0.07*
Italy	0.0573 [0.93] *0.01*	0.516*** [16.56] *0.08*
France	0.00314 [0.66] *0.00*	0.0136*** [3.33] *0.00*
United Kingdom	0.0146 [0.39] *0.00*	-0.0350 [-0.93] *-0.01*
Regressions include:		
Firm level controls		
Industry dummies	Yes	Yes
Region*time dummies		
Estimation technique	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on change in employees.

Each regression is run using the full specification detailed in Section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 regressions.

These estimations are performed only on a subsample of "tradeable" firms.

Financial constraint is proxied in three different ways: very small firms ($100,000 in assets) and very young firms (5 years or less since incorporation).

Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.

The effect of a $10,000 change in the value of housing collateral on the dependent variable, expressed in number of employees, is reported in italics.

Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

Table A5: Impact of changes in house prices on liabilities in financially constrained firms

Estimations contain "changes in regional income" and "changes in regional income" * "opacity"

Dependent variable: Change in liabilities	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.971*** [15.25]	0.507*** [8.05]	0.234*** [3.49]
Italy	0.508*** [11.97]	0.100*** [3.08]	0.131 [1.57]
France	0.0272*** [3.07]	0.0354*** [4.09]	0.00343 [0.31]
United Kingdom	0.130** [2.31]	-0.0269 [-1.04]	-0.0331 [-0.38]
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

Table 2 depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on change in liabilities. Each regression is run using the full specification detailed in Section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions.

Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.

Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.

The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.

Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

Table A6: Impact of changes in house prices on investment in financially constrained firms

Estimations contain "changes in regional income" and "changes in regional income" * "opacity"

Dependent variable: Investment	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.921*** [7.60]	0.552*** [10.98]	-0.174 [-1.18]
Italy	0.521*** [9.64]	0.204*** [5.92]	0.557*** [4.17]
France	0.0429*** [3.45]	0.0341*** [3.29]	0.0223 [1.57]
United Kingdom	0.0837* [1.97]	-0.0394 [-1.01]	-0.179 [-1.74]
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on investment.
Each regression is run using the full specification detailed in section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 individual regressions. Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing.
Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parenthesis.
The effect of a $1 change in the value of housing collateral on the dependent variable, expressed in dollars, is reported in italics.
Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

Table A7: Impact of changes in house prices on changes in employment in financially constrained firms

Estimations contain "changes in regional income" and "changes in regional income" * "opacity"

Dependent variable: Change in employment	(1) Interaction of "change in house prices" and "size"	(2) Interaction of "change in house prices" and "age"	(3) Interaction of "change in house prices" and "reliance on external financing"
Spain	0.110*** [7.91]	0.129*** [4.31]	0.0787** [2.28]
Italy	0.0246 [0.22]	0.487*** [7.06]	0.106 [1.32]
France	0.00118 [0.29]	-0.00508 [-1.04]	0.0134 [1.59]
United Kingdom	0.0646 [1.41]	-0.0612 [-1.34]	-0.0180 [-0.29]
Regressions include:			
Firm level controls	Yes	Yes	Yes
Industry dummies			
Region*time dummies			
Estimation technique	OLS	OLS	OLS

This table depicts the coefficient of the interaction term "financially constrained"*"change in house prices" on change in employees.
Each regression is run using the full specification detailed in Section 3; however, only the coefficient of interest is depicted for brevity as the Table represents 9 regressions.
Financial constraint is proxied in three different ways: very small firms ($100,000 in assets), very young firms (5 years or less since incorporation) and firms that are in industries more reliant on external financing. Heteroskedasticity robust standard errors clustered at the industry level. T-statistic in parethesis.
The effect of a $10,000 change in the value of housing collateral on the dependent variable, expressed in number of employees, is reported in italics.
Values are calculated using an approximate average house price. Only values for significant coefficients are reported.

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