

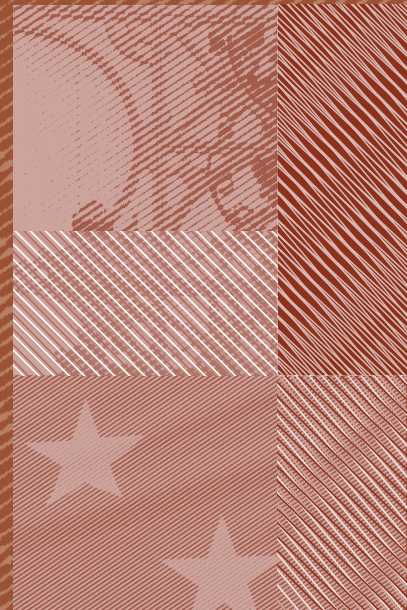
THE MICROECONOMIC ORIGINS OF THE SPANISH BOOM

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Enrique Moral-Benito

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Enrique Moral-Benito

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(*) This article summarizes a line of research encompassing several projects in collaboration with the following coauthors: Laura Alfaro, Sergi Basco, Manuel García-Santana, Gabriel Jiménez, David López-Rodríguez, Alberto Martín, Josep Pijoan-Mas, Roberto Ramos, Tom Schmitz, and Raquel Vegas. I am indebted to all of them for providing a pleasant environment in which to work over the last years. I also thank Tano Santos, Aitor Lacuesta, and seminar participants at European Commission, FUNCAS, and CaixaBank for useful discussion. The opinions and analyses are the responsibility of the authors and, therefore, do not necessarily coincide with those of the Banco de España or the Eurosystem.

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Abstract

The Spanish growth experience over the 1995-2007 period was characterized by the remarkable surge in employment and investment as well as the dismal evolution of productivity. These macroeconomic fluctuations were coupled with an unprecedented credit boom fueled by a housing bubble. This article reviews a line of research that investigates the connection between these developments using micro-level data on Spanish firms and banks. The evidence suggests that the abundant availability of credit, partially induced by the real estate bubble, and its propagation through the Spanish production network explain a sizable part of the massive accumulation of labor and capital. Also, the deterioration in the allocation of resources across firms is the main responsible of the fall in aggregate productivity. The allocation of credit across firms and municipalities, the softening of banks lending standards, and the low productivity of Spanish firms can partly explain this deterioration.

Keywords: Spain, firm level data, TFP, misallocation, input-output linkages.

JEL classification: D24, O11, O47, E44, G21, L25.

Resumen

El patrón de crecimiento de la economía española durante el período 1995-2007 se caracterizó por el notable aumento del empleo y de la inversión, así como por la ausencia de ganancias en productividad. Estos desarrollos macroeconómicos se combinaron con un aumento del crédito bancario, que, a su vez, se vio favorecido por incrementos sin precedentes en los precios del mercado inmobiliario. Este artículo resume una línea de investigación que explora la conexión entre estos desarrollos de acuerdo con datos microeconómicos sobre empresas y bancos españoles. La evidencia disponible sugiere que la abundante disponibilidad de crédito, parcialmente inducida por la burbuja inmobiliaria, y su propagación a través de la estructura productiva española explican una parte considerable de la acumulación masiva de empleo y capital. Además, el deterioro en la asignación de recursos entre empresas dentro de cada sector se revela como el principal responsable de la caída en la productividad agregada. La asignación del crédito entre las empresas, la relajación de los estándares crediticios de los bancos y la baja productividad de las empresas españolas pueden explicar, al menos parcialmente, este fenómeno.

Palabras clave: España, datos de empresa, PTF, asignación de recursos, relaciones *input-output*.

Códigos JEL: D24, O11, O47, E44, G21, L25.

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1 Introduction

The Spanish economy witnessed the longest expansion in recent history during the period 1995-2007. Real GDP grew above 3.5% per year over these 13 years. This figure is well above 2.4%, the average annual growth across other European countries. The ratio of Spanish income per capita to that of EU-12 was 77% in 1995 and reached 93% in 2007. Despite this performance is truly remarkable, it proved to be unsustainable with the burst of the global financial crisis. A deeper understanding of the drivers shaping the 1995-2007 boom might be helpful to learn from the past and ensure that the Spanish economy prolongs the current pace of sustained economic growth.

A standard growth accounting exercise for the 1995-2007 period shows that the Spanish boom was driven by factor accumulation (labor and capital) rather than by productivity gains. Since both labor and especially capital grew more than final production, total factor productivity (TFP) was reduced by 0.7% per year. This expansion was also accompanied by a housing bubble that fueled an unprecedented increase in credit, which expanded considerably faster than GDP. These two developments are in sharp contrast to other EU countries as shown in Section 2, which motivates the quest for the ultimate determinants of the Spanish boom experience. This article summarizes some pieces of evidence on how these aggregate fluctuations could have been originated through the lens of the micro data on Spanish firms and banks.

Section 3 quantifies the consequences of the unprecedented credit boom on the real economy. In line with previous results in the literature, Alfaro et al. (2018) find that the effects of banks credit supply shocks on firms employment and investment are sizable in the case of the Spanish economy.¹ Crucially, we also uncover the importance of the transmission of these shocks over the production network through buyer-supplier relationships. Indeed, the aggregate impact of credit shocks is doubled once this propagation is taken into account. The aggregate quantification in Alfaro et al. (2018) suggests that around 20% of overall employment growth in Spain over the expansion period can be explained by credit supply shocks.

Turning to the origins of this overall increase in credit supply, Martin et al. (2018) argue that the Spanish housing bubble initially displaced credit from non-construction to construction sectors, but eventually increased net worth of banks giving rise to a crowding-in effect from construction to non-construction sectors, which may partly explain the generalized boom in credit that fueled the surge in factor accumulation in all sectors.

Section 4 of this article discuss the role of resource misallocation across firms as the key driver of the dismal evolution of aggregate productivity. In García-Santana et al. (2016) we show that during the Spanish boom, too much resources, especially capital flows, were assigned to the worst

¹Identification of credit supply from the data relies on within-firm variation in a given year: imagine we observe credit growth of a given firm in a given year with two different banks; if credit growth is larger with one bank than with the other, it is assumed that it must be due to supply factors at the bank level since demand forces at the firm level are kept constant.

firms with the subsequent costs in terms of aggregate productivity.² Crucially, this phenomenon was present in all industries and not only on those related to the construction sector, which casts doubt on the conventional wisdom that the sectoral composition of the Spanish economy is responsible of the dismal evolution of productivity.

Despite more research is needed, Section 4 also outlines some of the factors that might be at the root of this misallocation of capital. First, in Basco et al. (2018) we show that too much credit was fueled to unproductive firms with high real-estate collateral in municipalities with higher housing prices growth.³ Second, Jiménez et al. (2018) illustrate that banks softened their credit standards in terms of firms' productivity during the boom. Third, it is worth highlighting the scarcity of attractive/productive projects available in the Spanish economy to be financed: Moral-Benito (2018) documents the poor performance of Spanish firms in terms of productivity vis-a-vis their European peers, even controlling for size, which is typically to blame.

Needless to say, there are other factors that played a role during the Spanish boom. For instance, Spain received massive migration inflows that contributed to an average annual population growth of 1.4% between 2000 and 2007 and increased the weight of the foreign population from 2 to 12% (see Izquierdo et al. (2016)). However, a detailed review of all of them is beyond the scope of the present article. Moreover, the reader must also take into account the so-called streetlight effect, which is a type of observational bias that occurs when people are searching for something and look only where it is easiest. In this case, the availability of firm- and bank-level data allows analyzing in detail the pattern of resources and credit allocation across firms, which seems to be crucial for understanding the macroeconomic evolution over the 1995-2007 period.

Finally, the ultimate cause that triggered all these events is not well understood yet. As argued by Santos (2014), many countries witnessed real estate bubbles over this period (US, Ireland, Greece), which points to the existence of worldwide common factors. Among them, loose monetary policies and the savings glut of export led economies are typically highlighted. Massive capital flows towards particular countries together with the decline in interest rates may lead to poor capital allocation decisions given that the signal-extraction problem faced by banks to identify good firms becomes more noisy (see Fernández-Villaverde et al. (2013)).

2 Aggregate facts

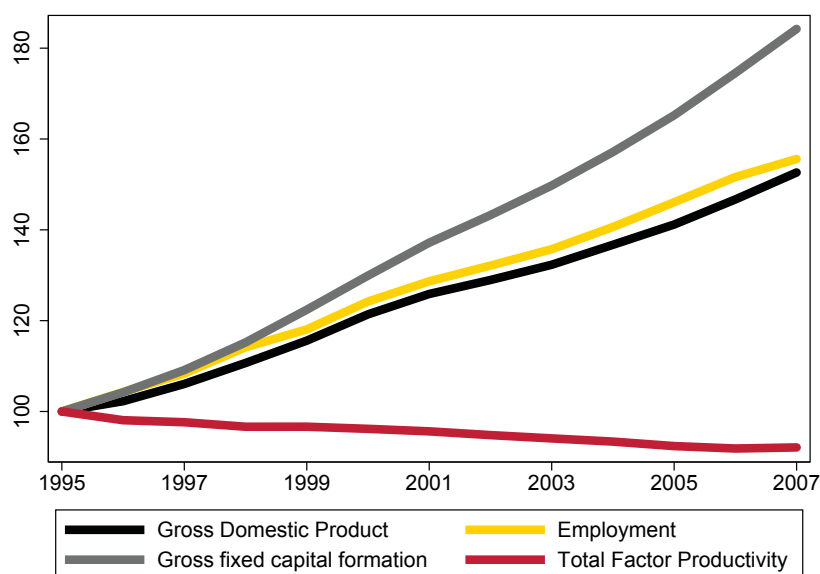
This section briefly summarizes the macroeconomic fluctuations that characterized the Spanish boom period in comparison to the remaining EU4 countries, namely, France, Germany, and Italy. The Spanish economy grew at the average rate of 3.5% per year between 1995 and 2007. This expansion,

²If the marginal Euro in the economy is used by a firm with lower marginal productivity of capital rather than by a higher productivity firm, aggregate productivity is dampened. According to our findings, this is precisely what characterized the functioning of the Spanish economy during the boom.

³A complementary explanation is that of Gopinath et al. (2017), who find evidence that the unprecedented fall in interest rates caused that capital was misallocated towards firms with more net worth but not necessarily higher productivity.

the longest in the twentieth century according to Berge and Jorda (2013), helped Spanish income per capita surpass the EU average in the early 2000s. However, a standard growth accounting exercise shows that the boom was driven by factor accumulation (labor and capital) rather than by increases in productivity. Figure 1 clearly illustrates this pattern. The employment contribution to output (total hours worked) expanded 3.8 percent a year in 1995-2007. This was the result of three main factors: a fast growing working age population, mainly due to migration flows, an increasing labor force participation rate, mainly reflecting the incorporation of women into the labor market, and a decline of the unemployment rate from the high values achieved in 1993. The capital stock also grew at an unprecedented pace of 5.2 percent a year. The rise of the construction sector together with easy borrowing conditions played an important role in the expansion of the capital stock in Spain. Since both labor and capital grew more than final production, total factor productivity (TFP) was reduced by 0.7% per year.

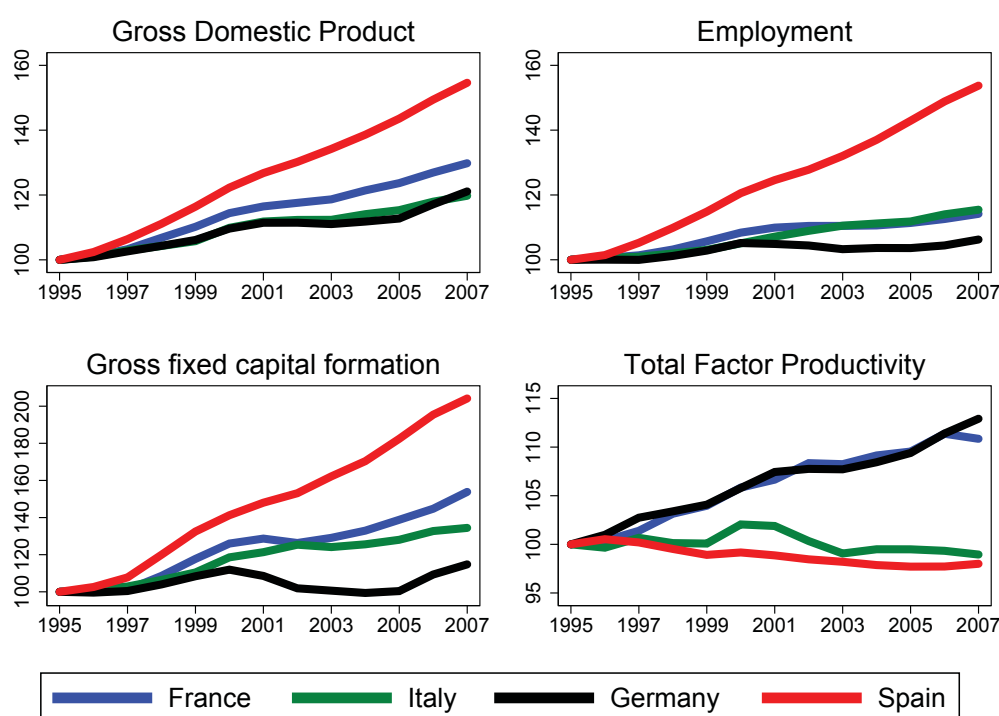
Figure 1: The Spanish growth experience.



Notes. This plot shows the evolution of GDP, capital, labor, and TFP in Spain during the period 1995-2007. Source: García-Santana et al. (2016).

As illustrated in Figure 2, these Spanish figures are in sharp contrast to those of France, Germany and Italy. In the average EU4 country, GDP growth was 1.8% per year with growth rates of 0.9% and 2.4% for labor and capital, respectively. As a result, TFP growth in the EU4 was on average 0.6% per year, which is in contrast to the Spanish annual rate of -0.7%. Similar differences arise if we compare the Spanish case with other developed economies such as the United States or the United Kingdom. To sum up, the Spanish growth experience over the 1995-2007 period seems rather unique in terms of standard growth accounting exercises.

Figure 2: Growth accounting across EU4 countries.



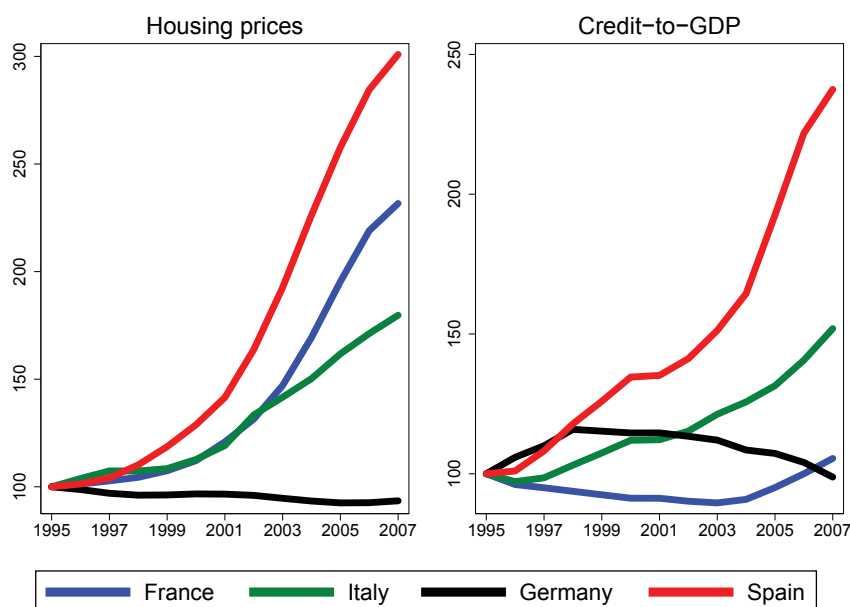
Notes. This plot shows the evolution of GDP, capital, labor, and TFP in France, Germany, Italy, and Spain during the period 1995-2007. Source: OECD Economic Outlook Database.

Last but not least, we can place the housing bubble together with the credit boom at the root of the Spanish macroeconomic evolution over the 1995-2007 period. After the 1993 crisis, housing construction and housing prices started to increase massively. According to Jimeno and Santos (2014), the Spanish economy presented some characteristics that made it especially prone for a housing bubble, namely, a banking sector capable of channeling capital inflows to mortgages, a construction sector which had build up large capacities through infrastructure projects in the 1980s and 1990s, and favourable demographic trends. Once prices started to rise, they were further sustained by changes in zoning and land use regulations in 1997 and 1998 (whose main effect was to decentralize and liberalize the decisions about housing permits), and lax lending standards, especially in regional banks subject to capture by the local political elites (Fernández-Villaverde et al. (2013), Jimeno and Santos (2014), Akin et al. (2014)). As a result, nominal house prices tripled between 1995 and 2007, as shown in the left panel of Figure 3.

The housing bubble was accompanied by a strong credit boom: the right panel of Figure 3 shows that credit to households and firms expanded considerably faster than GDP, leading to an unprecedented increase of the aggregate leverage ratio between 1995 to 2007. As in the case of the growth accounting exercises in Figure 2, the Spanish boom in housing prices and credit is remarkable

when looking at the remaining EU4 countries. Housing prices grew at the average rate of 9.2% per year between 1995 and 2007 in Spain, while this figure is 3.8% for the average EU4 country. Turning to credit, average annual growth of the credit-to-GDP ratio in Spain was 7.2%, while the corresponding average figure for the other EU4 countries is 1.3%.

Figure 3: The Spanish housing and credit boom.



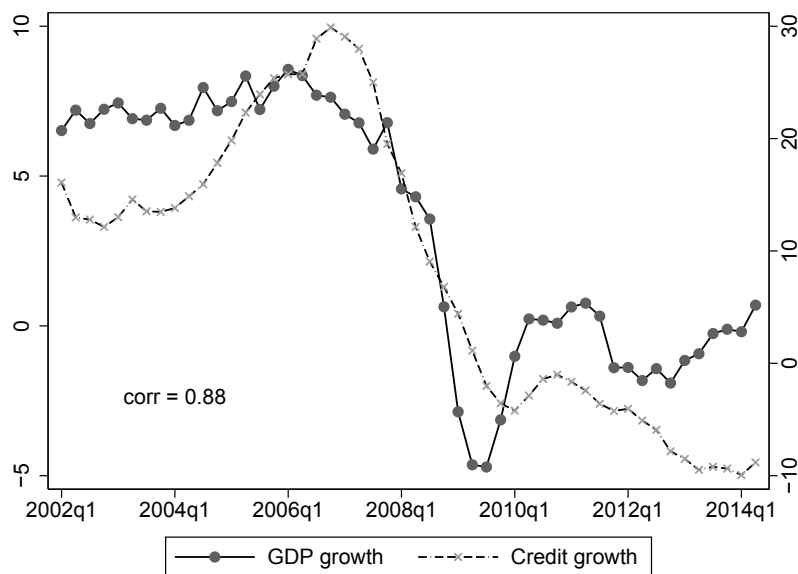
Notes. This plot shows the evolution of housing prices and credit-to-GDP ratios in France, Germany, Italy, and Spain during the period 1995-2007. Source: ECB Statistical Data Warehouse and World Development Indicators.

All in all, two facts stand out from the previous narrative of the Spanish growth experience over the 1995-2007 period: (i) the dismal evolution of aggregate productivity due to the massive accumulation of capital and labor; (ii) a housing bubble that fueled an unprecedented credit boom. The remainder of this article discuss how these developments are related through the lens of the micro data on Spanish firms and banks.

3 On the causes and consequences of the credit boom

As shown in Section 2, the macroeconomic evolution of the Spanish economy over the 1995-2007 period was coupled with an unprecedented credit boom. Figure 4 illustrates the high correlation between credit growth and economic activity. However, disentangling causes and consequences from this strong association poses several challenges. In this section we take crucial steps to address these challenges and explore the relationship between credit and the massive accumulation of productive factors (capital and labor).

Figure 4: Credit and output growth in Spain.



Notes. Credit (right axis) refers to bank credit to non-financial corporations taken from Banco de España and output (left axis) refers to nominal GDP taken from the National Statistics Institute (INE). Source: Alfaro et al. (2018).

Since the seminal paper by Khwaja and Mian (2008), the literature disentangles credit supply from credit demand by using data at the bank-firm (loan) level, and accounting for firm \times time fixed effects in the regressions. Intuitively, imagine one firm and two banks in year $t - 1$. If the credit of the firm grows more between $t - 1$ and t with the first bank, one can assume that this is because the credit supply of the first bank is larger than that of the second bank. This is so because demand factors are kept constant given the inclusion of firm \times time-specific effects.

Using this strategy together with Spanish Credit Registry data at the loan level, Alfaro et al. (2018) estimate unobserved credit supply shocks by means of bank \times time effects after accounting for credit demand (firm \times time effects).⁴ Armed with the bank-time credit supply shocks and having matched the credit registry information to firm-level administrative data, Alfaro et al. (2018) find that the estimated effects of credit supply on real variables are sizable: for instance, a one standard deviation increase in credit supply generates an increase of 0.3, 0.1 and 0.8 pp. in employment growth, output growth and investment, respectively.

Importantly, Alfaro et al. (2018) analyze not only the direct but also the indirect effects of bank-lending shocks. Firms not directly hit by a credit supply shock may be affected through buyer-supplier relations. For instance, if a supplier of firm j is hit by a negative credit supply shock, the reaction of this supplier may also affect production of firm j . The indirect effects of credit supply shocks can operate through various channels. If a negative credit supply shock hits firms operating in a given industry, the production in this industry will decrease, which is likely, in equilibrium,

⁴Note that Alfaro et al. (2018) estimate time-varying credit supply shocks instead of considering observed bank supply shocks as in Khwaja and Mian (2008), who consider exogenous variation in banks' liquidity due to nuclear tests in Pakistan.

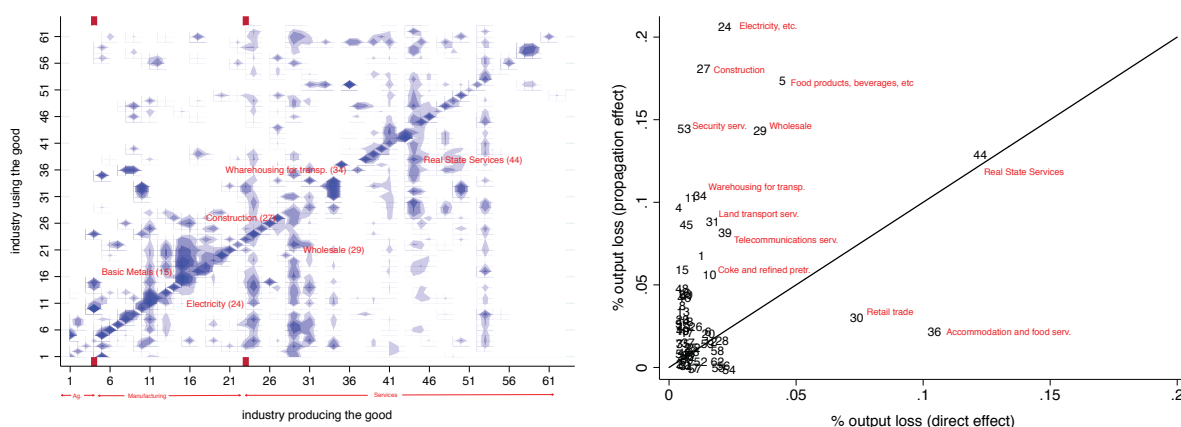
to make its output more expensive. Customer firms will then be forced to decrease production. Downstream propagation proxies for this effect. In addition, when a negative credit supply shock hits firms operating in a given industry, their revenue and, hence, their demand for intermediate goods, is likely to go down. This will affect their supplier industries, which will be forced to scale down production. Upstream propagation proxies for this indirect effect.

According to the results in Alfaro et al. (2018), indirect credit shocks through input-output propagation have a significant effect on the evolution of firm-level employment, output and investment over the 2003-2013 period. In particular, the magnitude of downstream propagation forces systematically dominates the direct effect of credit shocks.⁵ This finding corroborates the importance of network propagation in quantifying the real effects of credit shocks.

In order to quantify the aggregate impact of credit shocks on real activity, Alfaro et al. (2018) formulate a general equilibrium economy with buyer-supplier relations under the presence of financial frictions as in Bigio and La’o (2017) and study how the identified credit shocks at the bank-firm level are amplified through the economy using the Spanish Input-Output relations. In particular, Alfaro et al. (2018) aggregate the estimated credit supply shocks from the firm level to the industry level, in a way that makes them comparable over time in order to plug these shocks into the model and examine how they permeate the economy. The results indicate that IO linkages significantly amplify the effects of credit supply shocks. The model predicts, for instance, that around 0.74 pp. of the actual 4.20% employment growth between 2004 and 2005, in the middle of the boom period, was due to the identified credit supply shocks. Out of it, 1/2 was due to network/propagation effects and the other 1/2 was due to direct effects.

Alfaro et al. (2018) also use the model to investigate the relative importance of each sector in

Figure 5: IO structure (left panel) and output losses of isolated industry specific shocks (right panel)



Notes. The left panel shows the IO structure of the Spanish economy for the year 2010 (direct requirement matrix). Element $\{i, j\}$ represents the amount of euros spent by industry i in goods from industry j as a fraction of gross output in industry i . A contour plot method is used, showing only those shares greater than 1%, 2%, 5%, 10% and 20%. The right panel shows the output loss due to the direct (x-axis) and propagation effect (y-axis) between 2008 and 2009 of applying our industry-specific shocks one by one. Source: Alfaro et al. (2018).

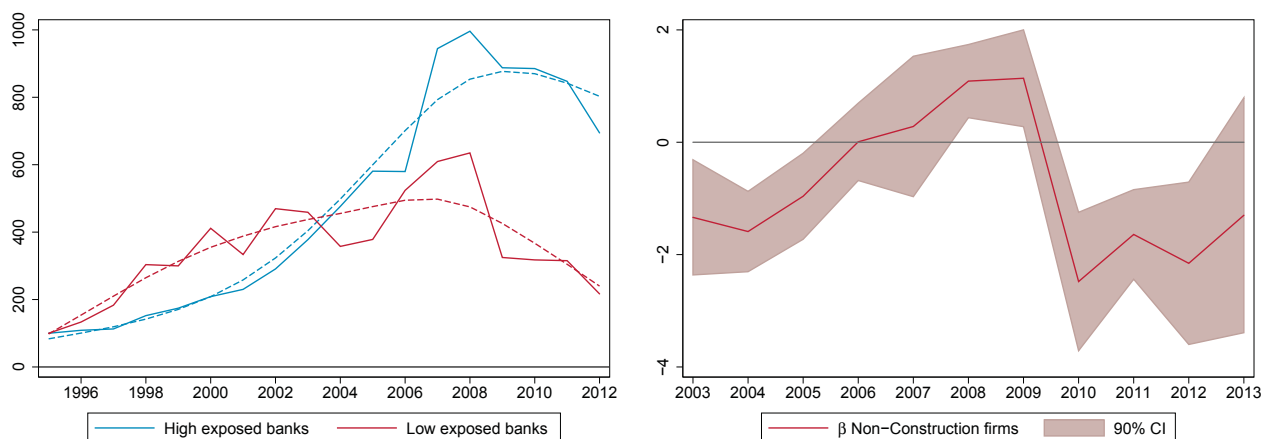
⁵Note also that while downstream propagation is larger during the financial crisis period (2008-2009), it is also sizable during the expansion phase analyzed in this article.

accounting for the aggregate effects. In particular, we compute counterfactual economies in which we only shock one industry at a time. Perhaps not surprisingly, the sector that generates the largest output drop is the real estate sector. Our model predicts that shocking just the real estate sector would generate an aggregate output loss of 0.24%. While it was hit particularly strongly by the credit supply shock at the time of the crisis, real estate is also intensively used by other sectors. In fact, our model predicts that around 50% of the 0.24% loss is explained by propagation of the shock to other sectors. We also find that shocking other central sectors like electricity services or wholesale would also generate large output losses (see Figure 5).

The estimates in Alfaro et al. (2018) suggest that bank credit supply increased substantially during the boom years in Spain. Regarding the origins of this credit supply increase, several hypotheses have been discussed in the literature despite the ultimate cause is not well understood yet. Jiménez et al. (2014) consider access to securitization as a source of variation in banks' credit supply, which substantially increased during the boom years. Basco and Lopez-Rodriguez (2017) analyze the origins of the residential mortgage debt boom in Spain and hint to a possible feedback between financial regulation, housing bubbles and mortgage debt. Finally, Fernández-Villaverde et al. (2013) emphasize the role of changes in zoning regulations, corruption and bad institutions.

According to the theoretical framework discussed in Martin et al. (2018), the Spanish housing bubble increased the housing sector's credit demand on impact, raising interest rates and crowding-out credit to goods production. However, the bubble eventually generated loan repayments which raised the profits and the net worth of Spanish banks, which enabled them to borrow more funds from the rest of the world, increasing capital inflows and expanding the supply of credit for all domestic sectors. The left panel of Figure 6 provides some suggestive evidence for this mechanism. During the first years of the bubble, credit to non-construction firms grew less in low-exposed banks than in high-exposed banks, supporting the static crowding-out effect. However, credit to non-construction firms from high-exposed banks eventually grew more and surpassed that of low-exposed banks, confirming the dynamic crowding-in effects of the bubble.

Figure 6: Credit to non-construction firms in different banks.



Notes. In the left panel, high (low) exposed banks are above (below) the 90th (10th) percentile of the share of mortgage-backed credit before 1995. Dashed lines are HP trends of the original series. The right panel shows the yearly OLS estimates of the effect of bank bubble exposure on credit growth at the bank-firm level in a sample of non-housing firms. Source: Martin et al. (2018).

The pattern in the left panel of Figure 6 is suggestive but not decisive evidence in favor of the hypothesis in Martin et al. (2018). The concern is that client firms of high and low-exposed banks may be systematically different. To alleviate this concern and concentrate on the credit supply side, Martin et al. (2018) exploit the rich structure of the Spanish Credit Registry data by using an empirical strategy inspired by Khwaja and Mian (2008). Precisely, we regress credit growth at the firm-bank level on time-sector dummies, bank exposure to the housing bubble, and firm \times time fixed effects. The latter are crucial, as they control for any firm-level credit demand shocks. Thus, the estimates capture the differential credit growth for the same firm with a more or less exposed bank. Martin et al. (2018) proxy banks exposure to the bubble by the ratio of mortgage-backed credit to total credit. Since bank exposure might be endogenous, we instrument it with pre-bubble exposure, that is, the ratio of mortgage-backed credit to total credit before 1996.

Regression results confirm the crowding-out / crowding-in patterns induced by the bubble as shown in the right panel of Figure 6. Around 2004, credit growth for the same non-construction firm was lower at banks which were more exposed to the housing bubble. In the last years of the boom, instead, this pattern was reversed and credit growth for the same non-construction firm became higher in more exposed banks. Note also that during the crash, credit growth for all firms was generally lower in more exposed banks.

According to this hypothesis, the real estate bubble fueled the unprecedented credit expansion observed during the Spanish boom in non-construction sectors.⁶ Understanding the ultimate origins of the Spanish housing bubble is beyond the scope of the present article. However, it is worth highlighting that several factors contributed to its appearance: demand for housing exploded as baby boomers became older and immigrants were coming to Spain, the soil liberalization laws in the late 1990s boosted the construction of new houses, the fiscal treatment of ownership versus rental provided incentives to buy rather than rent, and the marked decline in interest rates in Spain favored a real estate appreciation in search of yield.

4 A microscopic view of aggregate productivity

This section discusses the determinants of Spanish productivity and its evolution during the 1995-2007 period using a granular approach based on firm-level data. To be more concrete, the analysis is based on administrative data taken from the Spanish Commercial Registry, which contains the balance sheets of the universe of Spanish companies (Almunia et al. (2018) describe this database

⁶Needless to say, other factors such as loose monetary policies and the global saving glut also played a role.

in greater detail). Section 4.1 shows that capital flows were not assigned efficiently to the best firms within each sector, which explain the fall in aggregate productivity during the boom. Section 4.2 discusses the potential factors driving this deterioration in the allocation of resources.

4.1 Misallocation of resources across firms

A recent strand of the literature emphasizes the importance of the allocation of resources across firms within narrowly-defined sectors in explaining aggregate differences in productivity performance across countries. For instance, Hsieh and Klenow (2009) take the US economy as a benchmark and show that lower TFP in China and India can be attributed to a worse allocation of resources across firms. In their theoretical framework, an efficient / frictionless allocation of resources implies the maximum possible TFP and equal marginal productivities (of both capital and labor) for all firms within a given industry. Hence, any heterogeneity in marginal productivities across firms operating in the same 4-digit industry is interpreted as a measure of misallocation.⁷

More recently, there are several papers that analyze the evolution over time of these misallocation measures for a given country. Taking the initial year as a benchmark, they assess whether misallocation improves or deteriorates over time. Bartelsman et al. (2013) find that allocative efficiency remained roughly constant over the 1990s and early 2000s in several developed countries such as US, UK, Germany or the Netherlands, while it clearly increased for the transitional economies of Central and Eastern Europe. There is also evidence of increases in allocative efficiency across firms during economic expansions in Chile and Switzerland (see Chen and Irarrazabal (2015) and Lewrick et al. (2014), respectively). In contrast, Dias et al. (2015) document a sharp decline in allocative efficiency in Portugal during the stagnant period between 1996 and 2011. Finally, Bellone and Mallen-Pisano (2013) find that misallocation remained constant between 1998 and 2005 in France.

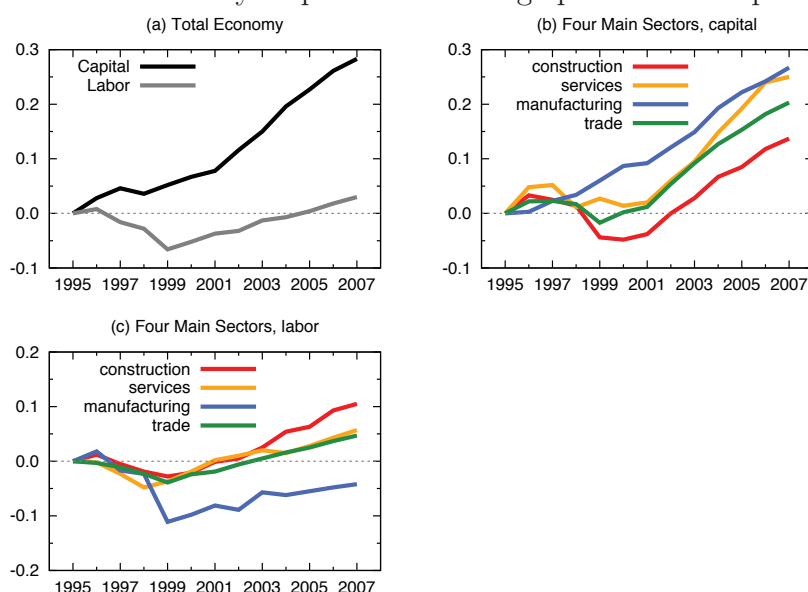
In the case of Spain, García-Santana et al. (2016) consider several misallocation measures with all of them pointing to a sharp deterioration in the allocation of resources during the boom years in all industries. Indeed, in the absence of this deterioration, aggregate TFP growth would have been close to 1% per year, in line with the world technological frontier. Moreover, García-Santana et al. (2016) also show that the role of misallocation across sectors (i.e. from non-construction to construction) is much more limited than that of misallocation across firms within each sector. In particular, we consider a counterfactual TFP measure, calculated by keeping the shares of the 5 largest sectors constant, equal to their values in 1995, alongside the evolution of the actual aggregate TFP measures in Spain. While this counterfactual TFP measure falls slightly more slowly than actual TFP, it still falls at an annual average rate of 0.4%, close to the actual 0.7% fall documented in Section 2.

⁷There are other model-free measures of misallocation such as the Olley and Pakes (1996) covariance, which capture the association between market shares and productivity: the stronger the association the better the allocation of resources.

Given that reallocation of resources across sectors accounts only for a small portion of the TFP decline during 1995-2007, we are left with the hypothesis of a worsening in the allocation of resources across firms within sectors. To investigate this, García-Santana et al. (2016) use firm-level administrative data on around 350,000 firms per year in manufacturing, construction, trade, and services for the period 1995-2007. Slicing the data into 518 4-digit industries, we document two patterns.

First, the within-sector dispersion of productivities across firms increased sharply during the expansion. In a frictionless economy we should observe no dispersion in firm-level revenue productivities (for both capital and labor) within each industry because higher productivity firms should expand, attracting more capital and workers, which in turn would diminish their revenue productivity (either because of decreasing returns to scale or because of downward-sloping demand curves). Hence, dis-

Figure 7: Within-industry dispersion of average products of capital and labor.



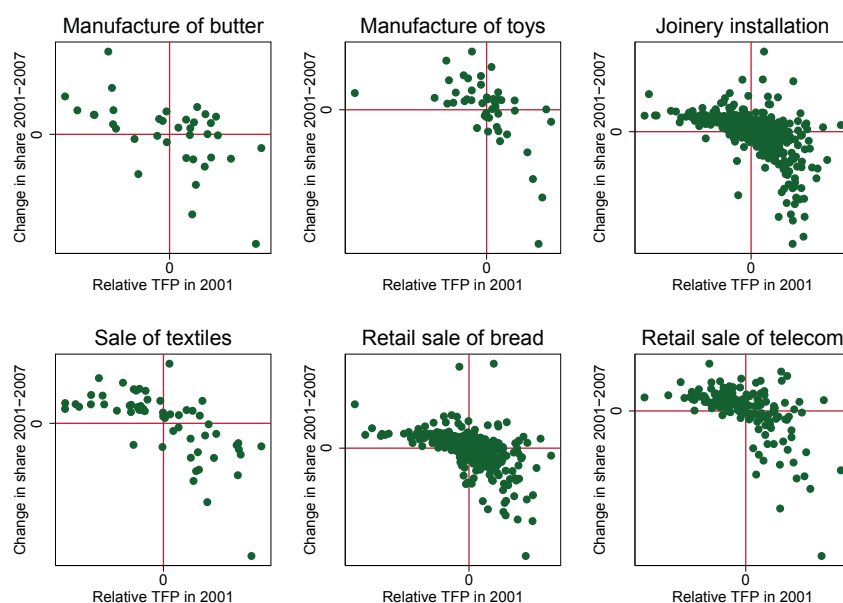
Notes. Panel (a) reports the within-sector standard deviations of average products of capital and labor measured at the 4-digit industry level and then aggregated to the whole economy using value added weights. We report the difference with respect to the 1995 values, which were 1.20 and 0.47 log points for capital and labor. Panels (b) and (c) report the aggregation for the four main sectors of activity. Source: García-Santana et al. (2016).

persion of revenue productivities across firms is a symptom of a poor allocation of resources across firms. This is the idea behind the methodology of Hsieh and Klenow (2009) outlined above. Figure 7 illustrates how dispersion of revenue productivity increased substantially in the case of capital while remained roughly constant in the case of labor. According to the analysis in García-Santana et al. (2016), this finding implies that, had misallocation (i.e. dispersion in revenue productivities) remained at its level in 1995, Spanish TFP would have grown by 0.8% per year. This result means that technological progress did not come to a halt in Spain, but capital and labor were not assigned efficiently to the best projects within each sector.

Second, firm growth during this period was inversely related to initial productivity. That is, during the boom years, low productivity firms were assigned more capital and labor than high

productivity firms. As a result, the former outgrew the latter. Figure 8 displays this surprising pattern for a selection of six industries, but this result is widespread across most industries. Following Foster et al. (2006), industry productivity growth can be decomposed into four parts: (i) firms productivity growth weighted by size; (ii) firms size growth weighted by productivity; (iii) a cross-term capturing the interaction between firms productivity growth and size growth; and (iv) two extra terms capturing entry and exit. The pattern documented in Figure 8 illustrates the second component of this decomposition, which turns out to explain the whole fall in productivity according to the evidence presented in García-Santana et al. (2016).

Figure 8: Misallocation of resources across firms in Spain.



Notes. Relative TFP refers to the logarithm of firm-specific TFP relative to the industry average. Change in share refers to the difference in firm-specific market share measured in terms of value added. Source: García-Santana et al. (2016).

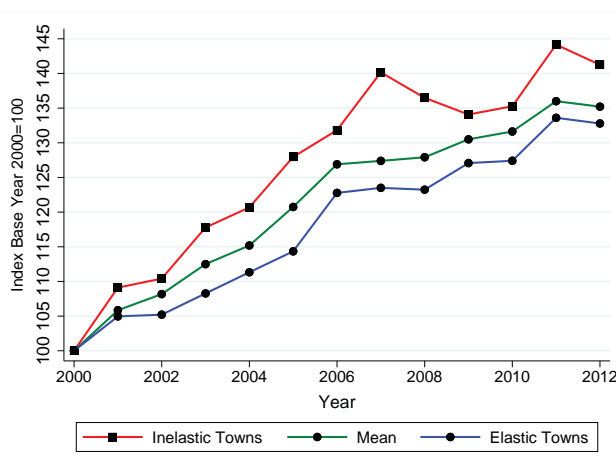
4.2 Drivers of the deterioration in the allocation of resources

The deterioration of resource allocation across firms was pervasive across all industries, but there was substantial variation among them. García-Santana et al. (2016) exploit this variation to shed some light on the possible factors behind the increase in misallocation. According to their findings, industries in which the incidence of regulations is greater present productivity losses twice as large as those in the remaining sectors. To be more concrete, we define two groups of industries according to the extent of public sector influence, either high or low. On aggregate, had the whole economy behaved as the low-incidence sectors, the overall TFP would have increased an extra 0.3% per year during 1995-2007. Understanding the mechanisms at the root of this pattern represents an exciting line of open research.

Alternatively, the role of firm financing might also explain the deterioration in allocative efficiency of capital. For instance, Gopinath et al. (2017) find that within sector misallocation is larger in industries with higher financial dependence. Focusing on manufacturing industries, Gopinath et al. (2017) document a significant increase in productivity losses from capital misallocation in Southern European countries, most notably Spain. They consider a model with size-dependent financial frictions and heterogeneous firms in which declining interest rates cause an increase in the dispersion in the productivity of capital. In their model, when the interest rate falls, all firms invest more and expand aggregate capital and output. However, capital inflows are misallocated towards firms that have higher net worth but are not necessarily more productive.

Basco et al. (2018) propose an alternative hypothesis based on the role of the housing bubble through the so-called collateral channel. We show that misallocation of resources across firms increased more in municipalities with higher housing prices growth. In order to illustrate the argument, Figure 9 plots the evolution of misallocation (variance of the capital-labor ratio) for three groups of municipalities. Overall, misallocation increased by 26.9% between 2000 and 2007, which is in line with the findings in García-Santana et al. (2016) and Gopinath et al. (2017). However, this aggregate figure conceals the differential increase across municipalities. Indeed, the blue (red) line reports the evolution of misallocation in housing supply elastic (inelastic) municipalities illustrating that the two lines grow apart during the housing bubble and start converge after the bubble burst. The increase in misallocation was around 20% in housing supply elastic municipalities and it was twice as large (around 40%) in housing supply inelastic municipalities. Therefore, this figure suggests that the housing bubble exacerbated the misallocation of capital in Spain. This suggestive evidence is corroborated by regression analysis at the industry-municipality level in Basco et al. (2018).

Figure 9: Misallocation and the Spanish housing bubble.



Notes. The red (blue) is the variance of the capital-labor ratio for municipalities in the first (fourth) quartile of the housing supply elasticity. The green line is the variance of the capital-labor ratio for all municipalities. Source: Basco et al. (2018).

Basco et al. (2018) also provide regression-based evidence at the firm-level in favor of this hypothesis. In particular, we consider housing supply elasticity as an instrument for house price growth at the municipality level in order to enhance identification of causal effects. According to the estimates in Basco et al. (2018), housing prices growth favored investment of firms with larger shares of real estate assets within the same industry. Also, firms located in municipalities with larger housing prices growth presented larger investment rates for a given share of real estate assets. Through the lens of the model of bubbles discussed in Basco et al. (2018), these two patterns can be interpreted as industry and geography misallocation, respectively. Using credit registry data, Basco et al. (2018) also show that misallocation of credit can account for this misallocation of capital, both in terms of the intensive margin (credit growth) and the extensive margin (loan granting). All in all, bank lending policies biased towards firms with higher collateral (higher value of housing-related assets) but not necessarily higher marginal productivity of capital would explain these patterns.

Jiménez et al. (2018) also investigate the potential role of bank lending policies in shaping aggregate TFP in the case of the Spanish economy. To be more concrete, we find that the probability that a loan application is granted increases with firm productivity, even after fully accounting for the supply side by means of bank-time fixed effects. This finding suggests that Spanish banks discriminate not only in terms of ex-ante credit risk but also in terms of firms productivity. This finding implies that bank lending policies might play a role in the allocation of resources/capital towards more or less productive firms.

On the other hand, Jiménez et al. (2018) also find that banks soften their lending standards during expansions. The economic cycle and the monetary policy stance affect lending standards in terms of firms' productivity, which means that when the economy is growing or in a loosen monetary policy environment, banks react taking on more risk. In other words, their screening process reduces the relative importance of productivity (or ex-ante credit risk), to the point of not taking them into account. Indeed, Figure 10 illustrates this pattern given that the association between firms' productivity and the probability of loan granting is not statistically different from zero during the boom years in Spain.⁸

In addition to the evolution over time discussed above, the Spanish economy is also characterized by the presence of a large number of small firms in comparison to other developed economies. For instance, firms with less than 9 employees account for 41% of total employment in Spain while this figure is 20% in Germany and 32% in France. Along these lines, Moral-Benito (2018) documents that Spanish firms are less productive than their European counterparts at all size categories even after controlling for the sector composition of the economy (see Figure 11). For instance, productivity of Spanish firms with 1-9 employees is 19% lower than the corresponding EU4 average according to EUROSTAT and 36% lower according to the OECD. In the case of large firms with more than

⁸Finally, it is also worth highlighting that these patterns are more marked in the case of less capitalized, less liquid and more profitable (higher risk profile) banks.

250 employees, Spanish firms' productivity is 12% and 17% lower according to EUROSTAT and the OECD.

Figure 10: Correlation between firm-specific TFP and loan granting.



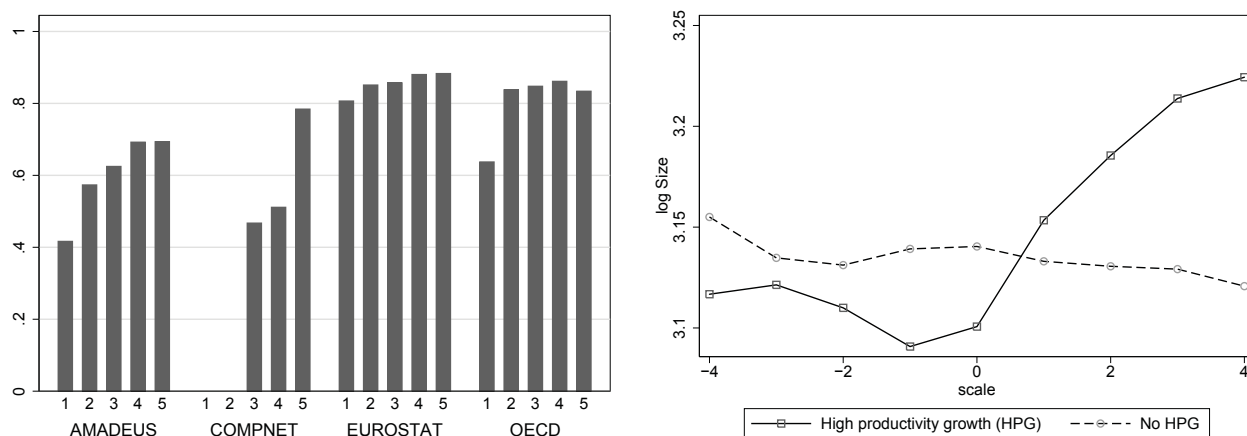
Notes. This figure plots the year-by-year coefficient of a regression of a loan granting dummy on TFP and a set of controls (size, age, default rate, total assets, industry, and financial expenditures) in a cross-section of Spanish firms. Source: Jiménez et al. (2018).

Using matching methods on a sample of Spanish firms, Moral-Benito (2018) shows that productivity shocks are followed by significant increases in firm size (see right panel of Figure 11) while size shocks are not followed by productivity gains at the firm level. According to these findings, the low productivity of Spanish firms with respect to their European counterparts might be at the root of the Spanish size distribution excessively biased towards small firms rather than the other way around. As a consequence, the low productivity at the firm level could also explain the dismal evolution of aggregate productivity in Spain.⁹

This finding raises an obvious question: Why do Spanish firms have worse abilities to convert inputs into output? In addition to inefficient product market regulations and low levels of competition that are typically to blame, we highlight here the potential role of managerial talent, quality of inputs, and R&D activities based on the survey by Syverson (2011). Available cross-country evidence reveals that Spanish firms perform substantially worse than their EU4 counterparts in all the three factors, which may explain, at least partially, their dismal performance in terms of productivity (see Moral-Benito, 2018).

⁹On the other hand, size-dependent policies, by preventing most productive firms to grow, can also explain a fraction of the aggregate productivity differences across countries (Guner et al. (2008)). Note however that Garicano, et al. (2016) and García-Santana and Pijoan-Mas (2014) have found modest effects when evaluating real size-dependent policies in France and India.

Figure 11: Spain-to-EU4 productivity ratio by firm size and the TFP-size nexus.



Notes. In the left panel, each bar plots the ratio of average productivity in Spain to average productivity in the remaining EU4 countries (Germany, France, and Italy). The five size categories reported are: (1) from 1 to 9 employees; (2) from 10 to 19 employees; (3) from 20 to 49 employees; (4) from 50 to 249 employees; (5) more than 250 employees. AMADEUS and COMPNET refer to total factor productivity ratios, while EUROSTAT and OECD refer to labor productivity ratios. AMADEUS and COMPNET figures refer to the period 2004-2012. EUROSTAT covers the period 2002-2013, and OECD refers to the year 2011. All the figures refer to the total economy including manufacturing, trade, construction and services. In the right panel, HPG firms are those with TFP growth above 10% in 2003. $scale = 0$ refers to the year 2003. The remaining firms are labeled as “No HPG” in the same year. The vertical axis plots average log size for these two different groups in the years before and after 2003. Source: Moral-Benito (2018).

5 Concluding Remarks

A 3.1 % expansion for the year 2017 as a whole marked Spain’s third successive year of above 3 per cent growth. This performance was, moreover, against the background of the continuing external surplus, the de-leveraging process of Spanish firms and households, and the positive growth of total factor productivity. These three phenomena suggest that the nature of the current recovery is more sustainable than that of the previous expansion. Still, understanding the drivers of the 1995-2007 boom may be helpful in order to avoid the pitfalls of the past.

GDP growth during the 1995-2007 expansion was truly remarkable in terms of magnitude and duration, but it was completely based on factor accumulation rather than productivity gains. The 1995-2007 expansion was also accompanied by a housing bubble that fueled an unprecedented increase in credit, which expanded even faster than GDP. This article summarizes a line of research investigating how these aggregate fluctuations could have been originated through the lens of the micro data on Spanish firms and banks.

Three main findings stand out. First, the abundant credit supply partially induced by the housing bubble significantly contributed to the massive accumulation of labor and capital. Second, the role of resource misallocation across firms appears to be the key driver of the dismal evolution of aggregate productivity. In particular, too much resources, especially capital flows, were assigned to the worst

firms within each industry with the subsequent costs in terms of aggregate productivity. Third, misallocation of credit during the boom period may partially explain the misallocation of capital. Too much credit was fueled to firms with high real-estate collateral, especially in municipalities with higher housing prices growth, regardless of their productivity. Indeed, there is also evidence that banks softened their credit standards in terms of firms' productivity.

Finally, two caveats are worth highlighting: on the one hand, other factors not discussed in this article played a role in shaping the characteristics of the Spanish boom (e.g. migration inflows); on the other hand, the ultimate causes that triggered all these events in the first place are not well understood yet (e.g. capital inflows and low interest rates, soil liberalization laws). A detailed review of these issues is beyond the scope of the present article.

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