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How important are capital markets imperfections in determining firm decisions and aggregate fluctuations?

Andrea Caggese

1. Introduction

Do financial problems affect firm investment, employment and production decisions? How much do financial imperfections matter for aggregate fluctuations? These questions are not new in the economic literature, but have been asked with renewed interest in relation to the recent 2007–2009 financial crisis. The timing of events during that period makes for an interesting case study. A systemic financial crisis started in August 2007, leading to a sharp increase in the cost of credit for firms and households. During the same period, a deep recession in the USA caused an increase in unemployment from around 5% to more than 10% in mid-2009. Among commentators and policy makers, the debate about how best to counter the negative effects of the financial crisis is often presented as the choice between two opposite views. On the one hand, some argue that firms

do not invest either because they lack demand for their goods, or because they have problems in obtaining credit. Therefore expansionary fiscal and monetary policies can increase aggregate demand, improve the availability of credit, and boost employment and output. On the other hand, others argue that firms do not invest precisely because of uncertainty regarding monetary and fiscal policy, and because of the threat of higher taxes. Therefore reductions in government expenditures and in taxes are the only ways to restore confidence in the business sector.

In order to evaluate the effectiveness of these different policies it is necessary to properly understand the dynamic relation between financial factors and firm behaviour. Several empirical studies have analyzed firm level data from the 2008–2009 period, and have confirmed that the reduction in investment and production during the crisis was more pronounced for financially constrained firms than for other firms.¹ Nonetheless it is still an open question to what extent financial factors were quantitatively important for the decline in aggregate production and employment during this period. Some authors argue that financing constraints were not important at the aggregate level because the internal funds owned by firms during and after the 2007–2009 crisis were sufficient to sustain pre-crisis levels of activity for the majority of US firms.² However, financing frictions also influence the investment decisions of financially healthy firms, when such firms take precautions in the face of more uncertain macroeconomic conditions, such as during recessions (Bloom, 2009). Therefore it is important to consider the “precautionary channel” of financial shocks: by making the future expected access to finance less likely, financial crises imply that firms cut investment and hiring to reduce the risk of losses and to increase their cushion of financial wealth for precautionary reasons. Furthermore, financing frictions especially affect young

and growing firms, and reduce the reallocation of resources from less productive to more productive businesses. Therefore they are potentially important in explaining the persistent low GDP and employment growth during the recent years, which is a common feature of past recoveries following financial crises (Reinhart and Rogoff, 2009).

This *opuscle* contributes to this debate by illustrating recent developments in the theory of firm behaviour under financing frictions. I will first illustrate three promising topics of research which bring us further towards understanding how financing problems and uncertainty affect individual firms as well as aggregate industry dynamics. I will then discuss recent research that builds on these theories in order to explain the link between finance and the recent great recession.³ Finally, I will discuss the policy implication of these theories. I will frequently refer to the “2007–2009 recession” because in most countries, including the USA, the recession formally lasted only those two years. However, as of the end of 2012, most developed countries are still suffering from very weak economic growth. Europe in particular is still affected by a combination of recession and financial crisis, and therefore the theories illustrated in this *opuscle* are also relevant for the current European economic problems.

The first research topic is **financing constraints and firm dynamics**. The process of entry, growth and exit of businesses shapes the distribution of firms in an industry and determines how efficiently resources are reallocated from old and declining production units to new and expanding ones. Financing constraints limit the entry and growth of new firms and therefore they are an important factor in affecting this reallocation process.

The second research topic is **financing constraints and precautionary saving**. Both households and firms take precautionary measures to face an uncertain future. Households reduce consumption and increase savings when employment prospects worsen. Firms lay off workers, or scale down expansion plans if demand growth becomes more volatile. This precautionary behaviour should be a relevant element in evaluating the importance of financing frictions, especially during financial crises and recessions, which are periods of heightened uncertainty.

The third research topic is **financial and real frictions: interaction and amplification**. Financial difficulties may have very different implications for firms depending on the flexibility and the efficiency with which they can adjust their production factors. Flexibility allows firms to cut expenditures and reduce losses during a recession. On the contrary, difficulties in varying the factors of production imply that firms take longer to adjust, suffer more losses, and in the presence of financing frictions are more likely to go bankrupt before a new expansion phase begins.

The outline of this *opuscle* is as follows: Sections 2 to 4 illustrates each of the three topics above. Section 5 discusses their application to the 2007-2009 recession and provides some policy implications.

2. Financing constraints and industry dynamics

The productive capacity of an economy relies on an efficient allocation of resources. If resources are better managed and more productive firms are allowed access to them, these firms grow faster than less productive ones and in equilibrium pro-

duce a larger share of output. However, this allocation process is dynamic. Firms evolve, grow, become mature, and eventually exit from production or merge with other firms. For this process of “creative destruction” to continue smoothly, it is important that economies are efficient in “re-allocating” resources from declining and obsolete firms to young productive ones.

The degree of reallocation in an industry can be measured by the dispersion of productivity across plants. If resources do not flow easily to the most productive and growing firms, these expand slowly and pose little competition to declining firms. The consequence is a large and persistent dispersion in productivity across productive units. More efficient institutions and markets reduce these problems, and therefore institutional factors explain differences in reallocation and productivity across countries.⁴ For example, Hsieh and Klenow (2009) estimate a much larger dispersion within narrowly defined industries in China and India compared with the USA. Their calculations imply that if capital and labour are hypothetically reallocated to equalize marginal products to the extent observed in the USA, manufacturing total factor productivity would increase by 30%–50% in China and 40%–60% in India.

Financial imperfections are potentially important to explain reallocation. Without external finance new entrepreneurs with bright ideas cannot finance their projects, and newly created firms cannot borrow to accelerate their investment rate and their growth. These reallocation problems are not only relevant for long-term growth, but also for business cycle fluctuations. For example, it is well known that during a “credit crunch” episode, usually at the beginning of a recession, bank lending is especially scarce for small and young firms, thus reducing entry and growth of new businesses and hampering reallocation.

While financing frictions worsen the allocation of resources, trade liberalization instead improves it (Melitz, 2003). For example, consider an industry with many firms, heterogeneous in terms of productivity. As long as the industry is not open to foreign competition, some low productivity firms may still manage to stay in business. However, when the country opens up to trade, these firms suffer from the additional pressure of foreign competitors, and are forced out of production. Conversely, the most productive domestic firms not only withstand foreign competition, but they also expand abroad and increase their size and their profits. The result is a significant improvement in the reallocation of resources in both the domestic and the foreign industry.

Since financing frictions and trade liberalization have opposite effects on reallocation, can the positive contribution of the latter compensate the negative contribution of the former? Caggese and Cuñat (2012) give a negative answer. They explain that financial imperfections not only prevent an efficient allocation of resources in the home industry, but they also reduce the reallocation gains from trade liberalization. Caggese and Cuñat (2012) argue that because young and small firms are financially vulnerable, then temporary financial difficulties may force them out of the market even though their projects are fundamentally sound and profitable. But if potential entrepreneurs expect such problems, they will not start a new firm in the first place. This negative effect will be especially strong for the most innovative and risky entrepreneurs, who are more uncertain about how long will it take before their new products can become profitable. The more a new firm expects its profits to be volatile in the initial phase of its life, the more financing frictions will deter its entry. In other words, financing frictions distort entry in favour of less risky and less productive firms and worsen the allocation of resources in

the industry operating in the home market. Some low-productivity and low-risk firms can continue producing because financing frictions prevent the entry of more productive and risky firms, thus reducing competition.

What is the impact of trade liberalization in such an industry? Caggese and Cuñat (2012) show that financing constraints do not necessarily reduce the number of firms that export. However, financing constraints reduce the aggregate productivity gains induced by trade liberalization by 25%. The explanation of this result is also based on a selection problem. When the industry opens up to trade, firms need an initial large fixed investment to start exporting. This reduces their financial resources in the short term, but compensates them in the longer term because exports increase their revenues and profits. However, financial resources are especially valuable for high-risk high-productivity firms, because they face more volatile profits. Therefore some of these firms prefer not to export for financial reasons, while the less risky and less productive firms, which value financial wealth less and also face less competition from riskier home and foreign firms, will start exporting instead. This analysis emphasizes that the relation between financing frictions, trade and productivity is important in explaining aggregate fluctuations in the recent recession, when financing frictions caused a large decline in trade volumes (Manova, 2011).

3. Undiversifiable risk and innovation

The basic idea behind most studies on the interaction between financial factors and the economy is that financial shocks reduce the availability of bank lending to firms, and also increase the

cost of direct bond financing. Faced with a lack of external financing, firms that do not have internal funds readily available have to cut investment, employment and production. However, financing frictions can also influence the investment decisions of financially healthy firms. When a financial crisis makes the future expected access to finance more uncertain, firms cut investment and hiring to increase their cushion of financial wealth (this can be thought of as a form of precautionary savings).

This precautionary channel has been extensively studied in the literature on entrepreneurial finance. Entrepreneurs are important because they are an engine of innovation and technological progress, and are responsible for a substantial portion of productivity and employment growth. Precautionary saving is particularly important for these firms because they have very limited diversification possibilities, since entrepreneurs typically reinvest all their earnings in the business they own and manage. Retained earnings are an important source of financing when external finance is costly. Moreover they reduce the impact of financing frictions and facilitate future external funding, because they align the interest of entrepreneur and external financier. The larger the stakes that entrepreneurs have in their own businesses, the more external financiers are confident that the entrepreneurs have the right incentives to repay their debts to avoid their businesses going bust. But retained earnings also have negative consequences: they concentrate all the wealth of the entrepreneurs in their firms, thus not allowing them to diversify their risks.

The concentration of risk in entrepreneurial firms is a well-documented empirical fact: Moskowitz and Vissing-Jørgensen (2002) analyze US data and show that 48% of all private equity is owned by households for whom it constitutes at least 75% of their total net worth.⁵ This excessive

concentration of risk discourages entrepreneurial risk taking. An entrepreneur could have a very promising new project to undertake, but which carries a large downside risk. If it were possible to diversify this risk by investing also in other ventures, the entrepreneur would be more inclined to start this project. Otherwise, it would be preferable to invest in a lower-risk lower-return project. This precautionary behaviour has important aggregate consequences: if entrepreneurs are indeed unable to diversify the risk of their business, then in periods of high uncertainty, such as during recessions, they will reduce their most risky and most innovative investment projects, thus reinforcing the decline in productivity and output.

This idea is developed by Perez (2010), who considers a business cycle model with financing frictions where entrepreneurs have access to a safe but low return short-term technology, and also to a highly profitable long-term risky technology that generates positive spillovers on other entrepreneurs. He shows that financing frictions bias entrepreneurs towards the short term technology to increase cash holdings and face future uncertainty. However, the simultaneous decrease in investment in the highly productive risky technology decreases aggregate productivity in the medium and long-term.

Caggese (2012) provides empirical firm-level evidence on how this precautionary behavior affects the uncertainty-innovation relation. His hypothesis is the following: in an industry where innovation is risky, uncertainty should negatively affect the innovation of entrepreneurial firms far more than that of publicly owned firms. Because of capital market imperfections, entrepreneurial households have most of their wealth invested in their own businesses. Therefore in response to an increase in uncertainty, their main instrument to rebalance the risk/return profile of their assets is

the choice of the riskiness of their investment projects. The same effect does not operate in publicly owned firms, where the firm's manager is only exposed to a fraction of the firm's risk, and can more easily diversify it.

Caggese (2012) tests this hypothesis with a data set of 11,417 Italian manufacturing firms, which combines yearly balance sheet data, for the 1992–2001 period, with three qualitative surveys, conducted in 1995, 1998 and 2001, that include detailed information concerning firms' property structure and their investment in different types of innovation. He uses variations in uncertainty across industries and over time to identify the effect of changes in uncertainty on the decisions to undertake risky innovation. His regression analyses find a significant and negative effect of uncertainty on the risky innovation of entrepreneurial firms while no significant effect is found on the risky innovation of non-entrepreneurial firms. After a 1% increase in uncertainty, the frequency of risky innovation falls by 0.69% for all entrepreneurial firms and by 0.92% for the group of less diversified ones. This empirical finding supports the view that uncertainty shocks may be important factors in explaining business cycle fluctuations. I will review the recent development in this literature in Section 5.

4. Financial and real frictions: interaction and amplification

This section describes how the impact of financial frictions on firms' decisions depends on their interactions with "real frictions". By real frictions I mean factors that reduce the flexibility of the firm's production process. These are costs of increasing productive inputs, such as capital installation costs and search costs in the labour market, and costs of

decreasing them, such as irreversibility of capital and firing costs.

How do financial and real frictions interact? Consider, for example, a firm with profitable investment opportunities which is expanding its activity. This firm grows by reinvesting all its earnings and borrowing up to the limit. Its borrowing capacity is large because macroeconomic conditions are favourable, the economy is in a boom and credit availability is not a problem. Now suppose the economy enters in a recession, and this firm expects a decline in demand for some time. The outcome of this shock depends on the flexibility of the firm's production structure. In a hypothetical absence of adjustment costs the firm could costlessly reduce its workforce, sell its excess capital, and just produce the amount of goods it can sell, thus making a small but positive profit. Consider now a more realistic case. The firm faces frictions in the labour market, and it is costly to dismiss workers. Moreover the firm's capital installed in the past cannot be easily sold or reconverted to different production processes. Since this firm cannot quickly reduce the cost of its inputs, the reduction in demand implies a drop in capacity utilization and an increase in losses.

In this situation, financial and real frictions amplify and interact with each other. After a negative shock a firm with real frictions but with no financing problems will be able to borrow and to sustain a period of financial losses while it adjusts its capital and labour, and will remain in operation. Likewise, a firm facing financial frictions but with flexible factors of production can scale down its activity and reduce its expenses. Even though external finance is not available, it will still be able to remain in operation using its internal resources. But a firm facing both frictions, and thus experiencing both losses too large to be absorbed by internal funds, and the inability to access external

finance, may be forced to liquidate and exit from production, even though it is an otherwise efficient firm with viable projects and profitable in the long run.

Caggese (2007) formally illustrates the interaction between real frictions and financial frictions with an industry model of profit maximizing firms subject to borrowing constraints. The firms produce using two factors of production: the first one is durable but irreversible, called “fixed capital”. Once installed, it can only be used in the firm and has zero liquidation value. The second one is non-durable, called “materials”. It represents intermediate inputs such as materials, services, and labour based on flexible contracts. Its residual value after production is zero, and therefore does not imply any irreversibility problem.

Caggese (2007) shows that irreversibility and financing constraints are complementary. Since the firm is unable to sell its excess capital, if it does not have enough financing available it will be forced to reduce variable capital instead. But then production falls, since with less variable inputs the firm does not use its plants efficiently, and it causes an even bigger reduction in profits and in the funds available for future variable capital purchases. This situation amplifies ex-ante the precautionary behaviour of the firm. Knowing that the situation described above could happen in the future, the firm is more cautious in investing in fixed capital during booms. By simulating an artificial industry with many heterogeneous firms, Caggese (2007) shows that this amplification effect helps to explain why aggregate investment in input inventories and deliveries of US durable manufacturing firms is very volatile (relative to capital) and procyclical, and why such procyclicality is highly asymmetrical, so that it disappears in periods when aggregate output is above its trend. More generally, the implications of the

model are useful in understanding firm dynamics in any productive sector that satisfies the following assumptions: a) both financing and irreversibility constraints are binding for a non-negligible share of firms in equilibrium; and b) firms produce output using a combination of reversible and irreversible inputs.

Indeed, real frictions are important not only for fixed capital, but also for employment. In many countries, Spain among others, the termination of permanent contracts is very costly. Firms can partially avoid such costs by hiring with fixed term contracts instead. The above discussion suggests that the interaction between firing costs and financing frictions should affect the choice between fixed term and permanent contracts. This possibility is verified by Caggese and Cuñat (2008), who develop a model to study the hiring and firing decisions of firms in the presence of financing constraints and dual labour markets in which both fixed-term contracts and permanent contracts coexist.

Given that fixed term contracts are flexible, why should firms bother to hire workers with permanent contracts in the first place? Permanent contracts encourage workers to invest in firm specific human capital, and in the long run they increase their productivity in the firm. Following this idea, Caggese and Cuñat (2008) consider a simple trade-off between the two types of contracts: fixed-term workers can be fired without cost, but are less productive than permanent workers. The authors show that financial market imperfections increase expected firing costs, thus making permanent contracts implicitly more expensive, and therefore encouraging the hiring of fixed term workers in expansion phases. In this environment, what happens if fixed-term contracts are introduced in an industry where only permanent contracts were available? Firms facing financing

frictions are very reluctant to hire with permanent contracts, because they cannot afford to pay firing costs in the future if they need to reduce their workforce after a decline in demand. Therefore, when fixed term contracts become available, financially constrained firms not only hire more fixed-term workers, but also use them to absorb a larger portion of total employment volatility. The consequence is that the introduction of fixed-term contracts makes permanent contracts of financially constrained firms less volatile than before, but since fixed-term contracts become much more volatile, the variability of total employment increases instead.

Caggese and Cuñat (2008) test the main predictions of the model on a sample of Italian manufacturing firms. The results confirm the predictions of the model. In particular, financially constrained firms have a larger proportion of fixed-term contracts and a higher volatility of total employment. The policy implications of these results are that the introduction of fixed-term contracts helps firms to reduce their exposure to financing constraints, but makes total employment of financially constrained firms more volatile. Therefore policies that aim to reduce the financing constraints faced by firms not only would decrease job instability in general, but would also help to close the gap in terms of job instability between fixed-term and permanent contracts.

5. The aggregate consequences of financing frictions and firm dynamics, and their policy implications

5.1 The 2007–2009 financial crisis and great recession

In Sections 2 to 4 I illustrated three channels that propagate and amplify the effects of firm financing constraints. Channel (i): financing frictions worsen the reallocation of resources across firms. Channel (ii): financing frictions increase firms' precautionary behaviour. Channel (iii): financing frictions are amplified by real frictions. In this section I evaluate the importance of these channels in explaining the 2007–2009 “great recession”.

Khan and Thomas (2011) consider the joint effect of financing frictions and of adjustment costs of capital on the reallocation of resources across firms, and verify whether the worsening in reallocation during the crisis can quantitatively explain the decline in output during the recession. They extend the analysis of Caggese (2007) in a general equilibrium framework, and consider an artificial economy where firms are heterogeneous, and at any point in time their cross-sectional distribution mirrors the one observed for US firms regarding investment, productivity and output. Khan and Thomas (2011) show that difficulties to access external finance prevent the growth of young and small firms, and that the lack of secondary markets to sell their fixed capital prevents large and unproductive firms to reduce their capital and free resources for smaller more productive ones.

To what extent can this reallocation problem explain the 2007–2009 recession? Khan and Thomas (2011) consider the effect of a “credit crunch”.

That is, of an unanticipated and persistent reduction of the borrowing capacity of all firms. They show that the resulting reduction in reallocation determines declines in aggregate output and investment consistent with the empirical data. This analysis suggests that reallocation problems across firms, amplified by real frictions, are an important channel to explain recessions accompanied by financial crises. However their quantitative importance remains in doubt. In particular, the financial shock applied by Khan and Thomas (2011) in their simulations is very large and lasts for many periods. It is not clear that the actual credit crunch to firms during the crisis has been as severe, and most certainly it has not been as persistent, because in the US economy lending conditions returned to normal very quickly after the crisis.

These considerations emphasize that any explanation of the recent crisis based on financial shocks needs to explain why the effects of such a shock have been so persistent over time. The channel (ii), which emphasizes how financing frictions amplify the cautious behaviour of firms in the presence of uncertainty, can potentially provide such an explanation, because uncertainty is known to be strongly anticyclical (Bloom, 2009). Arellano, Bai and Kehoe (2012) follow this approach. They consider an economy with heterogeneous firms where there are limits to the type of financing they can receive from outside investors. Consider, for example, a firm which has had some unlucky projects in the past, has suffered losses and has accumulated debt. This firm is otherwise profitable and well managed, but the inability to renegotiate the large stock of debt makes it unable to borrow additional funds and forces it to default. This liquidation is inefficient, and it generates a precautionary behaviour *ex ante*: when uncertainty increases, firms cut employment to reduce the level of activity and minimize the chances of suffering large losses and being forced to liquidate in

the future. In other words, financing frictions amplify the negative effect of uncertainty on risk taking. Arellano et al. (2012) apply their model to the 2007–2009 recession, and show that an increase in firm level uncertainty, which generates the observed increase in the cross-sectional dispersion of firms in the 2007–2009 recession, can generate about 67% of the decline in US GDP observed in the data.

One important question, not addressed in the analysis of Arellano et al. (2011), is what determines changes in uncertainty. The authors use dispersion across firms as an uncertainty shock. However, dispersion is itself the consequence of reallocation problems induced by financing problems, rather than the cause of such problems. More importantly, one striking feature of the 2007–2009 recession has been the large and persistent increase in unemployment. Therefore a theory trying to explain such recession with financing frictions should take into consideration the interaction between finance and the labour market.⁶

Caggese and Perez (2012) study this interaction by developing a theory that jointly analyzes the channels (i), (ii) and (iii). They consider an economy where both firms and households face risk. Firms face fluctuations in production costs, which cause fluctuations in profits. If they suffer too large losses they cannot obtain external finance and go bankrupt. Households face unemployment risk. If their employer defaults or closes because the enterprise is not productive any more, they become unemployed and need to search for another job. It is well known that in this situation financing frictions increase the precautionary saving of firms, while unemployment risk increases instead the precautionary saving of households. However, Caggese and Perez (2012) show that in the presence of both labour market frictions and financial imperfections the precautionary behav-

ior of households and firms interact and amplify each other, reducing output and employment in equilibrium.

In order to understand how these frictions interact, suppose that during a financial crisis a credit crunch increases the rate of defaults of firms with liquidity problems. Employment falls, and unemployment risk worsen because households expect that, once fired, they will remain unemployed for a longer time. Employed households will save more and consume less to build a precautionary stock of wealth, but in doing so they will reduce demand and the price of the goods sold by the firms. Therefore, as a larger fraction of financial wealth is held by households, a smaller fraction is instead held by firms. But once they are less wealthy, firms face a higher probability of default. Thus they further reduce risk taking, net hiring, and increase aggregate unemployment further.

Caggese and Perez (2012) show that this amplification effect considerably increases equilibrium unemployment. This result can be interpreted as a negative demand externality. Firms fire workers to maximize profits, but do not internalize the negative effect of the increase in unemployment on households. Households consume less to increase precautionary saving, but do not internalize the negative impact of their decision on the firms default risk. The authors simulate an artificial economy and show that the effects of this externality are quantitatively very large. They consider first an economy without financial frictions, calibrated to have an equilibrium unemployment level equal to 4%. Then they introduce financing frictions, but without precautionary saving by households. In this economy, where only channels (i) and (iii) are operational, financing frictions increase equilibrium unemployment to 5.8%. Finally, they keep the same level of frictions and introduce the precautionary behavior of households. In this case,

the additional amplification caused by channel (ii) increases equilibrium unemployment to a value as large as 11.2%.

5.2 Policy implications

As mentioned in the introduction, the debate about how best to counter the negative effects of the financial crisis is often presented as the choice between two opposite views: expansionary fiscal and monetary policies to increase aggregate demand and boost employment and output, versus reductions in government expenditures and low and stable tax levels to reduce uncertainty and restore confidence in the business sector.

The theoretical contributions analyzed in Section 5.1 imply that such a clear-cut distinction between these alternatives is misleading. Both the analysis of Arellano et al. (2012) and Caggese and Perez (2012) clearly indicate that policies which reduce uncertainty, for both firms and households, are a necessary condition to mitigate the recession. However, they also imply that active government policies could play a role in reducing such uncertainty. An expansionary monetary policy that reduces the interest rate and increases credit availability to firms may reduce bankruptcy risk and encourage firms to take more risks and hire more workers. Moreover the analysis of Caggese and Perez (2012) indicates that an expansionary fiscal policy that increases demand and reduces unemployment risk, for example an increase in unemployment benefits, would indirectly also reduce uncertainty for firms and have positive effects on aggregate employment.

Notes

(1) Among others, Campello, Graham and Harvey (2010) study a survey of 1050 chief financial officers (CFOs) in 39 countries in North America, Europe and Asia, during the financial crisis. CFOs were asked if they had the problem of limited credit availability, higher costs of external funds, or difficulties in originating or renewing a line of credit. They find that constrained firms planned to reduce investment much more than unconstrained firms. Almeida et al. (2010) study a cross section of firms and look at the proportion of long term debt that matures after the fall of 2007. They compare a treatment sample, firms with a lot of maturing long term debt, with a control sample, firms with similar characteristics (industry, credit rating, Q , etc...) but with less maturing long term debt. According to their findings, firms that had to refinance a lot of long term debt during the crisis significantly reduced their investment, much more than the firms in the control sample.

(2) See for example Monacelli, Quadrini and Trigari (2011) and Kvale and Stulz (2011).

(3) While this opuscle focuses on the theories that explain how financial shocks and financial imperfections affect firm dynamics, at the individual and the aggregate level, an equally important question concerns the role of financial intermediaries in originating and transmitting these shocks. These issues go beyond the scope of this opuscle, but are addressed in several recent papers, see for example Gertler and Kiyotaki (2010).

(4) Among others, see also Restuccia and Rogerson (2008), Buera and Shin (2010) and Arellano, Bai and Zhang (2012).

(5) Bitler, Moskowitz and Vissing-Jørgensen (2005) provide evidence that agency considerations play a key role in explaining why entrepreneurs on average hold large ownership stakes, indicating that their lack of diversification is driven by market imperfections rather than by risk-loving preferences.

(6) Authors moving in this direction are Schaal (2011), who considers a business cycle model with labour market frictions and uncertainty shocks, and Petrosky-Nadeau (2009), who analyses financing frictions and labour market frictions.

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