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FIRMS' INVESTMENTS DURING TWO CRISES

by Antonio De Socio* and Enrico Sette*

Abstract

We study the drivers of investment in Italy during the global financial crisis and the sovereign debt crisis. We focus on the effect of leverage while controlling for the role of other drivers: expected demand, profitability, access to credit and uncertainty. As firm-level leverage may be correlated with its unobservable characteristics, we employ instrumental variables estimation, using the median leverage of firms in the same industry and size decile as an instrument. We find that an increase in leverage equal to the interquartile range (about 30 percentage points) is associated with a lower investment rate of 1.9 and 1.4 percentage points (36 and 41 per cent of its mean) during each crisis. We also find that expected demand growth has a strong positive association with investments, whereas this relation holds for profitability only during the sovereign debt crisis. In contrast, credit rationing and uncertainty have a negative, although more limited, effect. Overall, ex-ante high firm indebtedness has been an important driver of the lower investment rate over the last decade.

Keywords: investment, leverage, crisis.
JEL Codes: E22, G31, G01.

Contents

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Firms' investments during two crises

Antonio De Socio and Enrico Sette

Bank of Italy – Department of Economics and Statistics

Abstract

We study the drivers of investment in Italy during the global financial crisis and the sovereign debt crisis. We focus on the effect of leverage while controlling for the role of other drivers: expected demand, profitability, access to credit and uncertainty. As firm-level leverage may be correlated with its unobservable characteristics, we employ instrumental variables estimation, using the median leverage of firms in the same industry and size decile as an instrument. We find that an increase in leverage equal to the interquartile range (about 30 percentage points) is associated with a lower investment rate of 1.9 and 1.4 percentage points (36 and 41 per cent of its mean) during each crisis. We also find that expected demand growth has a strong positive association with investments, whereas this relation holds for profitability only during the sovereign debt crisis. In contrast, credit rationing and uncertainty have a negative, although more limited, effect. Overall, ex-ante high firm indebtedness has been an important driver of the lower investment rate over the last decade.

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Contents

1. Introduction[1]

Firms' investments dropped dramatically during the Great Recession and they remained exceptionally sluggish in the following years, leading several commentators to talk about an "*investmentless* recovery". The weakness of capital accumulation has been especially acute in Europe also due to the Eurozone sovereign debt crisis. Investment may have been sluggish due to several reasons: lower expectations on future demand, reduced availability of internal or external funding – as profitability and access to credit worsened - and increased uncertainty on the economic outlook.

A potentially important role is played by the high leverage of firms: prior to the crisis, their financial structure became progressively more skewed towards debt (ECB, 2013); as the crisis hit, higher leverage may have amplified the drop in investment caused by other drivers through different channels. First, firms with higher debt must consume a larger fraction of their operating profits to service higher interest expenses, which leaves fewer internal resources to finance investment. This channel may have been more relevant during crisis periods because of the increased difficulties to access external funding, as lenders became more selective towards riskier (usually, more leveraged) borrowers. Second, firms may have chosen to deleverage to strengthen the balance sheet. In doing so they have cut on investment expenditure as they have used internal resources to pay back debt or to increase liquidity buffers. Finally, the "classic" debt overhang effect, suggesting that firms with high leverage at risk of default may pass good investment opportunities because most of the potential benefit of shareholders-financed investments would accrue to debtholders. This effect could be more pronounced after deep crises, when even moderate leverage ratios combined with lower profitability substantially increase firm default probabilities.

In this paper we study the impact of ex-ante firm leverage on its investment during and after the two crises which hit Italy in the last decade (the 2007-2008 financial crisis and Eurozone sovereign debt crisis) for two main reasons. First, we are particularly interested in the role of leverage as Italian firms are relatively undercapitalized with respect to other Euro area countries (De Socio and Finaldi Russo, 2016); hence, this feature is likely to play an important role in investment decisions. Second, Italy has been strongly hit by both crises, even if in a different manner: in 2008-09 both GDP and investment dropped sharply (by 6.5 and 12.7 per cent, respectively); in 2012-14 the cumulative decrease of GDP was lower (4.4 per cent), while investment continued to decline in all three years by a larger amount (17.2 per cent).

Given this background, we are also interested to evaluate if there are any differences between the two crises in the relation between investment and ex-ante leverage, because at the aggregate level there is no specific reason to expect it. Indeed only after 2012 the leverage of Italian firms started to decline, while liquidity started to increase; both changes suggest that they rebalanced their financial structure towards one with lower leverage and higher liquidity only after the sovereign debt crisis.[2] Hence leverage could have hampered investment in a similar way in both periods. Even if it is not the specific focus of our paper, we also evaluate if there are any differences between the two crises and the previous years.

We focus on leverage, but we also explore to what extent expected demand, access to credit, profitability, and uncertainty contributed to restrain firms' investments. To accomplish this goal, we use a unique

[1] We thank Antonio Bassanetti, Matteo Bugamelli, Federico Cingano, Francesco Columba, Paolo Finaldi Russo, Giorgio Gobbi, Filippo Ippolito, Francesca Lotti, Silvia Magri, José Luis Peydrò, Andrea Polo, Paolo Sestito, and an anonymous referee for helpful comments.

[2] Based on data for all non-financial corporation from Cerved, financial leverage (the ratio of financial debt over their sum with equity) remained at around 52 per cent between 2008 and 2012 and decreased thereafter; in the same periods, the share of liquid asset remained stable at 6 per cent and increased after 2012.

dataset which combines complete firm balance sheet data from Cerved (a Firm Register) with Survey data on firm access to credit, perceived uncertainty, and expected sales growth.[3] The latter is especially important as our firms are mostly unlisted, and it is therefore impossible to construct a standard Tobin's Q measure; hence the quantitative measure of expected demand proxies firms' investment opportunities.

We study the direct impact of leverage on investment using both a cross-sectional and a panel approach. We also analyze the indirect effect of leverage on investment through firm survival, by testing whether leverage had an effect on the probability of firm exit.

In our empirical analysis we rely on an instrumental variable (IV) approach to take into account endogeneity issues when assessing the relation between investment and leverage, as the latter is likely correlated with firm unobservable characteristics, most notably with firms' investment opportunities and profitability. To obtain an instrument for leverage, we resort to the large empirical evidence suggesting that it depends upon firm size, industry, asset tangibility, profitability, market to book ratio (Frank and Goyal 2008). Based on this evidence, we use as an instrument the median leverage of firms operating in the same industry and belonging to the same size decile before the crises, as explained in greater detail in section 2.1. Importantly, in all regressions, including the IV estimates, we control for industry and province fixed effects, as well as for firm size and the other characteristics summarized above (profitability, expected demand, credit rationing, uncertainty), measured as of the start of the sample period.

Our main finding is that leverage had the strongest impact on investments among the variables we consider and during both crises. An increase in leverage equal to the interquartile range (about 30 percentage points) is associated with a lower investment rate of 1.9 and 1.4 percentage points (36 and 41 per cent of its mean) during the financial and the sovereign debt crisis, respectively. The effect is heterogeneous across firms depending on their expected demand and the probability they are credit rationed, but only during the financial crisis period. We find no statistically significant effect of leverage on investment in the pre-crisis years (2004-2006).

We also find that, among the other possible drivers of investment, expected demand growth was strongly positively associated with investment, even if the effect was around 1/3 that of leverage. Uncertainty negatively affected investment, although the relation is not always statistically significant. As for the availability of internal or external funds, we find that profitability is positively correlated with investment only during the sovereign debt crisis; instead, lower profitability and higher credit rationing influence investment mainly through the extensive margin, by reducing firm survival rate.

Our work contributes to the international literature studying the behavior of corporate investment during crises. In particular, Kalemli-Ozcan et al. (2015) study the impact of high leverage and rollover risk on the investment of European firms during the financial and the sovereign debt crisis. They estimate a firm-level panel model. They do not use an instrument for leverage and control for demand through the inclusion of industry*time and country*time fixed effects. Their results show that debt overhang and rollover risk translated into lower investment rates. Gebauer et al. (2017) study the link between leverage and investments in Italy, Spain, Greece, Portugal, and Slovenia between 2005 and 2014, finding a negative impact of leverage on investment. They rely on OLS estimation or use lagged leverage ratios as instruments for leverage. Another related paper is Kalemli-Ozcan et al. (2016), who study the extent to which firm investment is affected by the bank lending channel or by the firm balance sheet channel following the

[3] For further details, see section 2.2 and the methodological notes: http://www.bancaditalia.it/pubblicazioni/indagine-imprese/2015-indagine-imprese/en_survey_methodology_invind.pdf?language_id=1.

currency crises of Mexico, Argentina and Brazil in the late 90s-early 00s. Their proxy for firms with weak balance sheets is high leverage and they document a key role for credit in hampering investment, and thus for the bank lending channel. We contribute to this literature by instrumenting leverage and by controlling for firm-level expected demand allowing us to obtain a proxy for Tobin's Q even in a sample of mostly unlisted firms.

Our work is also related to the growing literature on the effects of the financial crisis on firm investments. Duchin et al. (2010) show that listed firms more exposed to the Lehman shock cut investments more than other firms. Almeida et al. (2012) also focuses on listed firms and show that those which had bonds maturing after Lehman default experienced a lower investment rate compared to firms whose bonds matured before Lehman default and could therefore be more easily rolled-over. Barbiero et al. (2016) use a European firm-bank matched dataset between 2004 and 2013 and find that firms with higher leverage invest significantly less and that the effect is stronger if they borrow from undercapitalized banks. Other works focus on Italian data. Cingano et al. (2016) show and quantify the negative impact of the credit crunch following the 2007-2008 interbank market freeze on the investments of Italian firms and finds that about one quarter of the drop in investment can be traced back to the drop in bank credit supply. Balduzzi et al. (2017) document a negative effect of the increase in banks' cost of funding firms investment, using a representative sample of Italian firms between 2006 and 2013. Buono and Formai (2017) use mergers and acquisitions among banks between 2000 and 2012 as an instrument for credit restrictions at the firm-level finding that these negatively affect investment both in crisis and in normal times. Gaiotti (2013) shows that credit availability affected investment during the Great Recession. Bond et al. (2015) estimate an error correction model for investment on Italian data from 1995 to 2013, finding that weak demand has been the key driver of investment after 2008 and that credit constraints have a significant impact at the firm level, but not in aggregate terms.[4] We contribute to this literature by focusing on the effect of leverage on investment and by extending the sample reaching 2015 thus covering two crises in order to evaluate if there are any differences between them.

The rest of the paper is organized as follows: section 2 describes the empirical strategy and the data; section 3 illustrates the main results, extensions, and robustness checks; section 4 concludes and derives some policy implications.

2. Empirical strategy and Data

2.1 Empirical Strategy

Our empirical strategy is designed to assess the relation between investments during two periods of crises and firms' characteristics before the crises. Using a cross-sectional specification allow us to evaluate if pre-crisis heterogeneity (particularly in leverage, credit rationing, expected demand or profitability) influenced investment later. Such specification has a relevant advantage, as these variables are reasonably predetermined, especially during the (unexpected) financial crisis.

[4] Our micro-level approach complements two studies on the dynamics of investment in Italy taking a macro perspective. Busetti et al. (2016) use the Bank of Italy macro-econometric model showing that increased limits in accessing finance had a strong negative impact during both crises. Giordano et al. (2017) use an error correction model based on aggregate time series from the financial accounts and find that high firm indebtedness is negatively correlated with capital accumulation.

In particular we define two sub-periods of slightly different length: 2007-2010 (which includes the financial crisis of 2007-08, the sharp recession of 2009 and the recovery of 2010) and 2011-2015 (which includes the sovereign debt crisis of 2011, the long recession of 2012-14 and the recovery of 2015). The dependent variable is the average investment ratio over each of the two sub-periods. In both regressions the control variables include firm-level characteristics measured before each crisis (2006 for the financial crisis and 2010 for the sovereign debt crisis).

In addition, we also test a similar specification on a pre-crisis period (2004-2006, and controls as of 2003) and we also run a robustness check pooling all firm*year observations together using the full panel of firms over the period 2003-2015.

The baseline empirical model is the following cross-sectional investment equation:

$$\frac{MI_i}{A_{i,0}} = \beta Leverage_{i,0} + \gamma Expected\ Demand\ growth_{i,0} + \theta Profitability_{i,0} + \mu D(Rationed)_{i,0} + \rho Size_{i,0} + \pi Cash_{i,0} + \delta \frac{I_i}{A_{i-1}} + \eta Productivity_{i,0} + \lambda Export_{i,0} + \alpha_{s,0} + \alpha_{p,0} + \varepsilon_i \quad (1)$$

The dependent variable is the average investment ratio in the 4 years following year 0 for the financial crisis (year 0 is 2006), and 5 years following year 0 for the sovereign debt crisis (year 0 is 2010), where investment includes the flow of both tangible and intangible assets net of disinvestments,[5] while assets are measured as of December of year 0; variables denoted with subscript 0 refers to the same date.

We include two main controls for the financial situation of the firm, which is relevant to proxy its access to external finance. The first is *Leverage*, calculated as the ratio between financial debt and assets; we include this variable as a proxy of firm riskiness and also as a measure of the reliance on external finance before the crisis.[6] The second is a dummy *D(Rationed)* based on a question from the Survey that measures firms' access to credit: it equals 1 if the firm reports to be strictly credit rationed, that is it would like more credit, would be ready to pay a higher interest rate and have been denied credit by banks. We expect a negative relation between these two variables and investments.

We include firms' expected turnover for next year (*Expected Demand growth*), as a proxy of firm's investment opportunities: this measure plays the same role as Tobin's Q which is only available for firms listed on the stock market. This measure allows us to directly control for expected future profitability, through expected demand, even in the absence of stock market data. In Table A.1 of the Appendix we show evidence of the high predictive power of expected demand growth for realized demand growth.[7]

[5] This variable is derived from the sum of three items of Cerved flow of funds (tangible plus intangible investment, minus disinvestment). We cannot use the information on investment from the Survey, as it is available only for the year(s) in which a firm participates. Data from Cerved for 2008 could be distorted by a revaluation of assets allowed in that year, which could overestimate the flow of investment if a firm reports a simplified balance sheet (*Bilancio semplificato*). However in our analysis this potential issue is reduced by two factors: around 90 per cent of the firms we include in our dataset report an ordinary balance sheet (*Bilancio ordinario*); for a similar share of firms we obtain their data from a more precise source (*Centrale dei Bilanci*).

[6] Our leverage ratio is commonly used in corporate finance literature; we include in the numerator only financial debts (bank loans, other loans, bonds), thus excluding other debts (e.g. trade and fiscal debts, provisions). We use book leverage as the vast majority of the firms in our sample are private companies. We also tried an alternative measure of leverage (financial debt over its sum with equity), but the instrument we can derive for it (as described in section 2.1) is weak as the cross-sectional variability of this alternative measure of leverage is much lower than ours.

[7] Expected demand growth refers to the year following that of the Survey. This is then a noisy measure for demand expectations and for years +2, 3, etc. Therefore, estimated coefficients are likely to be affected by an attenuation bias.

We also include *Profitability* (EBITDA/assets), which captures both the availability of internal sources of funding and the return on investment, hence the incentives to invest in the firm. We also include *Cash* (liquidity/assets) as another proxy of available internal resources. We expect profitability to be positively related with investment, as internal resources are a relevant source of funding, especially for credit-constrained firms (e.g. Fazzari, Hubbard, Petersen, 1988; Farre-Mensa and Ljungqvist, 2016). The relation between investment and liquidity is less clear, as on the one hand liquidity could represent a source of internal funding (especially if above a level consistent with normal business activity), on the other hand it represents an alternative to investment (Almeida et al. 2004, Campello et al. 2011).

Overall, the inclusion of these five variables allows us to control and measure the three key determinants of investments: the ability to tap external funds, the expected demand growth, and the availability of internal funds. As further controls which are also useful to reduce cross-sectional heterogeneity, we include: *Size* (measured by the logarithm of firm assets), as usually larger firms tend to invest relatively less; the one-year lagged investment rate ($\frac{I_i}{A_{i-1}}$) which is likely to affect the subsequent investment rate; *Productivity* (valued added per worker), as more productive firms could have an incentive to invest more, unless the higher labor-productivity depends on an already high level of capital; $Export$ (the share of sales from exports to total sales), as exporters are usually more productive and could invest more.

Finally, we include two sets of period-specific fixed effects, at (2-digit Nace) sector (α_s) and province (α_p) level, to control for specific industry and geographic characteristics in each sub-period. These effects also capture macro conditions and all other economy-wide factors affecting firms' investment. The standard errors of the estimated coefficients are clustered at both sector and province level.

In some regressions we extend our model to include also another variable which is however available only for a smaller subsample of firms: *Uncertainty*, calculated as the difference between the maximum and the minimum expected growth rate of sales in the following year, which may negatively affect investment (Dixit and Pyndick 1994, Guiso and Parigi 1999, Bloom 2009).[8]

Importantly, we instrument leverage since it is likely correlated with unobservable firm characteristics. For example, firms with high leverage may have undertaken especially risky investments before the crisis, and as a consequence may suffer from an especially pronounced drop in demand during the crisis, leading them to massively cut investment. Alternatively, firms that have better investment opportunities, and as a consequence suffer from a more modest drop in demand during the crisis, may also be able to obtain external finance more easily and thus be more leveraged. As these two simple stories indicate, it is likely that leverage is correlated with unobservable firm characteristics; moreover, the correlation may go either way.

To obtain an instrument for leverage, we resort to the large empirical evidence suggesting that it depends upon firm size, industry, asset tangibility, profitability, market to book ratio (Frank and Goyal, 2008). Taking stock of this evidence, we rely on the first two firm characteristics (2-digit Nace industry and size) to derive an instrument for leverage as follows (see also section 2.2 for further details).[9] First, we divide the distribution of a sample of Italian non-financial corporations for which we have both Cerved and Credit

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The alternative would be to include an average over the whole period, but in this case the variable would be biased as it would be partly contemporaneous to the dependent variable.

[8] The question on uncertainty refers to the year following the survey. See footnote 7 and section 2.2.

[9] Section 2.2 describes our two main data sources (Survey and Cerved) and explains why we relied on a third data source (Credit Register) to be able to derive our instrumental variable.

Register data in deciles according to size in each industry for our reference years (2006 and 2010); in this way, we construct clusters of industry-size deciles. Second, we compute the median leverage in each cluster between 2003 and 2006 (i.e. before the crises). Third, we use this value as our instrument for leverage, i.e. the (instrumented) leverage of each firm in the Survey depends on the size/sector cluster it belong to as derived in the first step from the Cerved-Credit Register sample. Importantly, unless in 2010 a firm in the Survey belongs to a different industry or size class, its leverage is the same in the time span we consider; this is useful as it prevents feedback effects from investment choices to leverage during the crisis.[10]

We call this variable $Leverage_{SiDi,0}$ as it depends on the sector and the size class of the firm at year 0 (which is 2006 or 2010 in our two main specifications). In our estimation we first estimate equation (1) using OLS; then we use our instrument to:

i) estimate a reduced form equation in which we just plug in the instrument instead of firm leverage in (1)

$$\frac{MI_i}{A_{i,0}} = \Psi Leverage_{SiDi,0} + \gamma Expected\ Demand\ growth_{i,0} + \theta Profitability_{i,0} + \mu D(Rationed)_{i,0} + \rho Size_{i,0} + \pi Cash_{i,0} + \delta \frac{I_i}{A_{i-1}} + \eta Productivity_{i,0} + \lambda Export_{i,0} + \alpha_{s,0} + \alpha_{p,0} + \varepsilon_i \quad (1a)$$

ii) run a two stage least square (2SLS) where the firm-level leverage we use in (1) is derived from the following first stage

$$Leverage_{i,0} = \Pi Leverage_{SiDi,0} + \gamma Expected\ Demand\ growth_{i,0} + \theta Profitability_{i,0} + \mu D(Rationed)_{i,0} + \rho Size_{i,0} + \pi Cash_{i,0} + \delta \frac{I_i}{A_{i-1}} + \eta Productivity_{i,0} + \lambda Export_{i,0} + \alpha_{s,0} + \alpha_{p,0} + \varepsilon_i \quad (1b)$$

As we include the same variables in these two regressions, we can interpret (1a) as the "intention to treat"; hence the coefficient of leverage in (1) estimated with 2SLS is related to the others two according to the following relation: $\beta_{IV} = \frac{\Psi}{\Pi}$.

The relevance of our instrument relies on the fact that: i) we are deriving it on the base of two structural characteristics of firms, industry and size, which have been found in the literature to be among the determinants of individual firm leverage;[11] ii) as shown in section 3.1 we find a correlation between leverage and our instrument based on the reduced form (1a) and more importantly on the first stage (1b).

The exogeneity of our instrument is based on following facts: i) it is a median across firms of the size/sector cluster (a limited number of which belong to the Survey), hence it is arguably uncorrelated with firm-specific unobservable characteristics; ii) such median leverage is constructed using data between 2003 and 2006, so as to look at the distribution of leverage in "normal" times; iii) our instrument must satisfy the exclusion restriction controlling for several firm-level characteristics, which are likely to affect both leverage and investment (e.g. firm profitability and size), and industry and province fixed effects.

[10] Firms investing relatively more during the financial crisis may have as a consequence higher leverage as of the beginning of the sovereign crisis. Since they invested more in the previous years they may decide to invest relatively less, a standard mean-reversion effect, during the sovereign crisis.

[11] We decide not to use as a further clustering variables tangibility or profitability because the first is more directly related to (cumulative) investment decisions, while the second is more volatile so that a firm could belong to different clusters over the years we are considering.

The other key regressors in our specification (expected demand, firm profitability and the extent of credit rationing) may depend on firm quality. We do not have good instruments for these measures, and therefore parameter estimates for these variables should be interpreted with some caution; the only safeguard against endogeneity is the fact that they are lagged with respect to investment decision.

An alternative approach to estimate investment equations is relying on panel GMM with firm fixed effects. This approach has weaknesses. First, using lagged values of the endogenous values as instruments may not solve the endogeneity issues if there is some persistence when using closer lags, and may lead to weak instruments bias when using farther lags (the same applies to differences). Second, our approach may be better taking into account the lumpiness of investments. Yet, as a robustness check, we also estimate the investment equation year-by-year as a panel, including firm and year fixed effects.

In our main specification we include firms that survived between 2006 and 2010. This is a conservative choice: if one is ready to assume that firms with higher leverage are more likely to exit and that exiting firms tend to have fewer investment opportunities, then this potential survivorship bias goes against finding a negative impact of leverage on investment.

However, aggregate investment may be lower both because incumbent firms reduce investment and because of firm exiting the market. To test the impact of leverage on the probability of firm exit, and thus on the extensive margin of aggregate investment, we use the same regression framework described before (i.e. OLS, reduced form and IV regressions) to look at the determinants of the probability of survival during the same two periods:

$$PS_i = \beta Leverage_{i,0} + \gamma Expected\ Demand\ growth_{i,0} + \theta Profitability_{i,0} + \mu D(Rationed)_{i,0} + \rho Size_{i,0} + \pi Cash_{i,0} + \delta \frac{I_i}{A_{i-1}} + \eta Productivity_{i,0} + \lambda Export_{i,0} + \alpha_s + \alpha_p + \varepsilon_i$$

where PS is a dummy equal to 1 if the firm survives during the financial or debt crisis, and zero if it exits the market.

2.2 Data and descriptive statistics

The main source of our work is the Survey of Industrial and Service Firms (SISF), run every year between March and May by the Bank of Italy and administered to around 4,000 non-financial firms with at least 20 employees operating in the industrial and service sectors. We use the Survey to have a key variable in our investment equation (Expected demand growth) and another relevant one (access to credit, using the dummy "Rationed"). We integrate the information for these firms with the Firm register (CERVED) which includes balance sheet information for the universe of Italian corporations (chiefly, leverage and profitability).

Near all the firms included in Cerved are very small companies and a significant share of firms has zero leverage (around 40 per cent of the total), while the Survey is based on firms with at least 20 employees. Hence, the use of all Cerved firms would not be immediately adequate to derive our instrument, as most of our larger (and mostly leveraged) firms would belong to the last decile of the size distribution.

In order to derive an instrument for firm' leverage that has enough variability for the firms in the same size-industry cluster (whose median values is also affected by a large number of zeros), we rely on another

source: the Credit Register, which identifies firms with a relation with the financial system. This step reduces the number of firms from 650.000 to 340.000 in 2006 and from 720.000 to 480.000 in 2010; however, the effect on our Survey sample is much smaller (see later), as the firms included are mostly leveraged and have relation with the financial system. Moreover, around 90 per cent of total investment of Italian non-financial corporations comes from the firms that are also included in the Credit Register, hence this subsample is overwhelming representative of our variable of interest. We have also other reasons to include only firms that have lending relationships, because our focus is mainly on financial variables we wish to exclude firms which: i) may have zero leverage, as bank credit is the key (often the only) source of external finance for the great majority of the (unlisted) firms in our sample; ii) may have special difficulties to access bank credit because they have no credit history.

We construct our dataset starting from the firms of the Survey (4,243 in 2006, 3,930 in 2010) and selecting those for which we have answers to our variables of interest and for which we have complete balance sheet information in CERVED for our analysis, thus excluding firms from the Survey that are not incorporated and those that do not have data to derive our variables of interest, ending with 3,753 firms in 2006 and 3,517 in 2010. Then, as described above, we select firms that have a lending relationship with the banking system as listed in the Credit Register. After this step, the sample size slightly decreases to 3,591 firms in 2006 and 3,390 in 2010.

In the investment regressions we include firms which have been active for the whole 4 years period 2007-2010 for the financial crisis sample, and for the whole 5 years sample for the sovereign debt crisis sample. Final sample size is then 3,015 for the former, and 2,756 for the latter. We also rely on a subsample of 820 and 1462 firms (in 2006 and 2010, respectively) to evaluate the relationship between firm-level investment and uncertainty. The number of firms is reduced to around ¼ of the sample in 2006 as the question was asked to a lower share of firms. This selection creates some limitations in our econometric approach discussed in section 3.2, so that the results for the first time span have to be taken with caution.

Turning to the characteristics of our data, the main descriptive statistics of the variables we use in the regression analysis are shown in Table 1.[12] There are both similarities and differences between the two crises which are worthwhile to mention.

On the one hand, leverage, size and cash holdings to total assets of firms did not change much between December 2006 and December 2010. The stability of leverage confirms aggregate data in that there was limited deleveraging during and after the financial crisis. Also expected turnover growth is mostly positive and similar across both periods, suggesting that both crises were unexpected.

Instead, profitability was much lower and rationing was higher in 2010 (a year of economic growth), suggesting that firms' cash flows were still recovering from the financial crisis and banks were more cautious in their lending. Also firms' uncertainty on their expected turnover growth was higher. The main difference between the two time periods is in the average investment rate, which decreased by around 40 per cent in the sovereign debt crisis compared to the financial crisis; the ratio is especially lower in the upper side of the cross-sectional distribution.

Table A.2 of the Appendix presents correlation matrices of the variables we include in the regressions, showing no sign of multicollinearity. As expected, firm leverage is negatively correlated with cash holdings and profitability and positively correlated with size, although the correlation is somewhat low; firm

[12] All variables are winsorised at the 1st and 99th percentile.

leverage is also positively correlated with the instrument, the average leverage in the industry-size cluster the firm belongs to. Finally, access to credit (measured by the dummy "Rationed") is positively correlated with leverage (and similarly, negatively correlated with profitability and liquidity); as the correlation is low, these two variables are likely to measure different features of firms' financial conditions.

3. Results

3.1 Baseline Estimates

Estimates of our cross-sectional investment equation on the financial crisis are shown in Table 2. Column 1 shows OLS estimates. Leverage has a negative and significant coefficient, with a relevant economic effect: moving from the 25th to the 75th percentile of leverage is associated with a 0.4 percentage points drop in the investment rate, which represents about 10 percent of the mean (5.4 per cent). However, as argued above, leverage may be correlated with firm unobservable characteristics, and therefore we instrument leverage with a measure of firm-leverage at the industry-size decile cluster. As a first step, we estimate a reduced form equation ("intention to treat") in which we just plug the instrument in the second stage instead of firm leverage. Results are shown in column 2, indicating that the instrument has a negative and highly significant effect on the investment rate. This is a first check about the validity of our instrument. Columns 3 and 4 display 2SLS estimates. Column 4 shows the first stage. The instrument has a positive and highly significant coefficient and the Kleibergen-Paap cluster robust F-statistic at 35.0 suggests the instrument is not weak. Column 3 shows the second stage regression results. Leverage has a negative and highly significant coefficient, with a large economic effect: moving from the 25th to the 75th percentile of leverage is associated with a 1.9 percentage points drop in the investment rate (36 per cent of its mean). The larger effect of the IV estimates suggests that OLS estimates suffer from an attenuation bias, which may be due to firms with higher investment opportunities being more able to obtain external finance and thus increase their leverage.

A key control variable in our specification is expected demand growth. Its coefficient is positive, highly significant and stable in all three specifications. The economic effect is smaller than that of leverage, but nonetheless sizable: in the IV estimations, moving from the 25th to the 75th percentile of expected demand growth is associated with a 0.7 percentage points drop in the investment rate. These results suggest that expected demand growth is a good proxy for investment opportunities and as such an important driver of firms investment decisions. Given its strong statistical significance, it likely does not suffer much from the measurement errors which plague Tobin's Q for listed firms (Hennessy and Whited 2005).

The dummy for being credit rationed is negative, but significant only in the OLS and the reduced form specifications. A similar pattern characterizes profitability (EBITDA to assets): its coefficient is positive and highly significant in both the OLS and the reduced form specification, while it becomes negative but largely not significant in the 2SLS. In both cases, this suggests that once their effect on leverage is controlled for (they are part of the predicted leverage from the first stage), their direct impact on investment is weak.[13] In the case of credit rationing, sample size is also a likely reason for its lack of significance: less than 40 firms reports to be credit rationed in 2006. Liquidity (cash holdings to total assets) is negative and significant only in the 2SLS specification. This result may be counterintuitive, but it is in line with predictions from structural models (Riddick and Whited 2009): once the endogeneity of leverage is controlled for, cash holdings reflect

[13] Collinearity among the variables is not a concern, see Table A2.

the shadow cost of external finance. For this reason, higher cash balances signal that the firm expects to be financially constrained, and therefore invests less.

Concerning the other control variables, size is negatively associated with the investment rate, confirming that smaller firms are more dynamic and invest more (in relative terms); lagged investment rate has instead a positive coefficient, which suggests that firms show some persistence in their investment rate. The coefficients of both variables are similar in size across OLS, reduced form, and 2SLS models. Finally, productivity and the exported share of turnover are never significant, hence these cross-sectional differences are unrelated with investment.

Next, we turn to the sovereign debt crisis period. We use the same specification as for the financial crisis on a different time span (2011 to 2015) and firm controls are as of end 2010. Results are shown in Table 3. Leverage continue to be negatively related with investment and significant in the OLS, reduced form and 2SLS specification; also in this case our instrument is not weak (Kleibergen-Paap cluster robust F-statistic is 18.5). The results of the 2SLS estimation, which we assume as our baseline, are shown in column 3. They indicate that the economic effect of leverage, standardized by the mean investment rate, is broadly similar than during the previous crisis: an increase from the 25th to the 75th percentile of leverage is associated with a 1.4 percentage point lower investment rate, 41 per cent of its mean (3.4 per cent). For the OLS specification the same increase in leverage is associated with a much smaller decrease of the investment rate (0.2 percentage point lower).

The other controls behave in a similar fashion as in the financial crisis sample, the main difference is that now profitability is positive and statistically significant also in the 2SLS specification. This suggests that operating profits, which proxy for both the return on investment and for the availability of internal funds to finance capital accumulation, played a more important role during the sovereign crises, also because it was lower due to negative effects of the previous crisis. The export share is positive and significant too, suggesting that export represented a source of alternative demand which stimulated investment. Value added per worker is instead negatively related to investment. This may reflect a correlation with firm previous investment plans: higher investment before the crisis may have increased labor productivity, and made further investments in a period of difficult access to external finance less necessary.

Overall, these results point to a negative and significant impact of leverage on investment, suggesting that high firm indebtedness before a crisis represents an important drag on following aggregate output, after controlling for other firms' characteristics, chiefly expected demand growth.

3.2 Extensions

We extend the baseline estimates in two main directions. First, we include a measure of firm-level uncertainty. This is obtained exploiting a specific question in the Survey: firms are asked to report a minimum and a maximum level for expected sales growth in the year following the survey. We take the difference between the maximum and the minimum reported growth rate and use it as a measure of uncertainty. The intuition is that the larger the difference between the maximum and the minimum reflects higher uncertainty. The question on uncertainty is asked only to a sub-sample of firms (around ¼ in 2006 and ½ in 2010) so that sample size drops to 820 and 1462.

Results are shown in Table 4. Two things are worth noticing. First, leverage has a very similar effect, negative and significant in most specifications, as in the baseline. In the IV on the financial crisis sample, the coefficient of leverage is not statistically significant (column 3), but the point estimate is very similar to that of the baseline, indicating that the IV estimate are imprecise due to the much smaller sample size; also the F-test in the first stage is much lower with respect to the entire sample (11.9 versus 35.0). Second, uncertainty has a negative effect on investment, but statistical significance is somewhat weak. However, the point estimate is similar across specifications (OLS, reduced form, 2SLS), and the effects are economically significant: moving from the 25th to the 75th percentile is associated with a 0.2-0.3 percentage points drop in the investment rate.

Second, we test for heterogeneous effects of leverage, interacting it with expected turnover growth, profitability, and with the dummy "rationed" (Table 5). We found that the relationship between leverage and investment was heterogeneous only during the financial crisis, when the negative effect of leverage was stronger for firms with higher expected demand growth, suggesting that leverage was a drag on investment especially for firms with better growth opportunities. We also find that the effect was marginally lower for credit rationed firms ("leverage*Rationed"), even if the coefficient is reduced only by 1.4% indicating that the effect is small and economically not significant.[14]

3.3 Robustness checks

A first important test concerns the pre-crisis period. We run the baseline specification using controls as of 2003 and the average investment rate between 2004 and 2006 as dependent variable. Results are shown in Table 6. Leverage has no effect on investment in any of the specifications, while the instrument is still strong in the first stage: the sign is still negative, but the size of the coefficient is very small. Regarding the other main coefficients, operating profitability is consistently positive and strongly significant and the dummy for rationed firms is negative and significant in all specifications but the 2SLS in which significance is marginal. Finally, the relation between investment and expected demand is still positive and marginally significant (p-value in the IV regression is 10.1). Overall these findings confirm the broad picture and suggest that higher ex-ante firm indebtedness have a modest impact on firm investment in times of economic expansions and limited credit constraints.

Secondly, we estimate a panel investment regression using the whole sample period from 2003 to 2015. We argued in section 2 that this specification may not be optimal for our purposes and the results are not entirely comparable as in our cross-section specifications we are not considering the time dimension at firm-level. Nevertheless, to be in line with the literature using this approach, we present panel estimates to compare them with our baseline findings. Results are presented in Table 7, where columns (1-3) are based on the full sample and columns (4-6) are based on firms for which we also have information on *Uncertainty.* Estimates in columns 2 and 5 include the lagged investment rate[15] and columns 3 and 6 have interactions

[14] This counterintuitive result could be related to a survivorship bias. Rationed firms have been able to invest slightly more than similarly leveraged non-rationed ones just because they were able to survive: as credit rationed firms are more likely to exit from the market (see section 3.4), the surviving ones could be the best of them.

[15] This is a lagged dependent variable in a model with individual effects, and estimates may be biased (Nickell 1981). A way to deal with this issue would be to use the panel GMM approach (Arellano-Bover 1995). We found that estimates are very sensitive to the choice of the lag of the instruments and not robust enough. Since the shortcomings of this approach are well known, especially the issue of weak instruments, we decided to show results with and without the

for the two crisis periods. Importantly results are consistent across specifications, and are, at least qualitatively, consistent with those of our baseline specification: leverage has a negative and significant effect on investment. The economic effect is smaller than in the 2SLS but substantially higher than in the OLS: moving from the 25th to the 75th percentiles of leverage is associated with a 0.7 percentage points lower investment rate. An important test concerns the interaction of leverage with the dummy crisis, shown in column 3. We find that leverage has a negative and weakly significant effect on investment before the crisis and during the financial crisis. The effect becomes more negative and more significant during the sovereign debt crisis.

Third, we exclude the final year in our two samples (i.e. 2010 and 2015), as during these years the economy was growing and the point estimates of our variables of interest are mostly unchanged (Table 8); in particular, the effect of leverage becomes marginally significant during the financial debt crisis (p-value is 10.1), while it is stronger and remains highly significant during the sovereign debt crisis.

We finally modify the clustering of standard errors. Since the instrument varies at the industry-decile of size level, we cluster on these cells and statistical significance slightly increases (for our variable of interest) or is unchanged (for most of the other variables).

3.4 Firm Survival

As a final extension of our analysis we test the impact of leverage and of the other main control variables (expected demand growth, profitability, access to credit) on the probability of firm survival during each time span. We use the same specification as in the baseline model, using a dummy equal to 1 if the firm remains in the dataset in all years, 0 otherwise as dependent variable.[16] The probability of survival in our sample decreased from 84.0 per cent during the financial crisis to 81.3 during the sovereign debt crisis; we also observe that surviving firms were characterized by higher profitability and lower probability of rationing before the crises. The share of investment of these firms is low, but still relevant: 9 and 16 per cent in 2006 and 2010, respectively, so they contributed to the drop in aggregate investment.

Results are shown in tables 9 and 10 for the financial and the sovereign debt crisis, respectively. The first important result is that leverage has a negative and significant coefficient on firm survival in the OLS specification, while it has a positive but largely not significant coefficient in both the reduced form and the 2SLS specification. This is an important finding because it suggests that what matters for firm survival is the firm idiosyncratic component. This in turn is likely correlated with the probability of default and in this way with firm survival as shown by Bonaccorsi et al. 2015 and Ferretti et al. 2016. Once leverage is measured at the industry-size cluster level, and thus purged of firm idiosyncratic characteristics, it has no effect on firm survival. This is coherent with expectations and it represents an important consistency check for our instrument, which captures structural determinants of leverage, purged by firm-specific characteristics which may correlate with firm propensity to invest.

lagged dependent variable: since the coefficient of leverage is stable across specification we can be reassured that its omission should not be a strong concern.

[16] The number of firms is accordingly higher, as explained in section 2.2. Strictly speaking the firms exit the dataset in that, although still formally alive, they report a balance sheet in which assets or sales are zero, or they do not report a balance sheet at all. This typically occurs when a firm is not really operating in the year.

Concerning the other main control variables, two firm characteristics have a significant impact on the probability of survival: the dummy for being rationed and profitability, the former negative, the latter positive, as expected from the descriptive analysis. The economic significance of profitability is sizeable and not dissimilar across the two crises: in the IV regression an increase from the 25th to the 75th percentile of profitability is associated with an increase of probability of exit of 5 percentage points (around 1/3 of the mean) during the financial crisis and of 4 percentage points (around 1/5 of the higher mean) during the sovereign debt crisis; if the firm was rationed the probability of exit increases by 20 and 15 percentage points, respectively. None of the other regressors seems to affect the probability of firm survival, expect for firm size in some specifications.

Importantly, results are similar in the pre-crisis period (Table 11): credit rationed and more profitable firms are, respectively, less and more likely to survive. Leverage still has no effect, except in the OLS specification in which the coefficient is positive and significant, suggesting that in general higher leverage increase the probability of exit from the market, due to the higher debt burden or the lower possibility to obtain external financing.

4. Conclusions

This paper studies the effect of leverage on investments during the two recessions which hit Italy after the global financial crisis and the sovereign debt crisis. We control for the endogeneity of leverage and include several other key determinants of investments at firm level, mostly obtained from survey data: expected demand growth, a measure of credit rationing, profitability, uncertainty.

Among the variables we considered, we find that leverage has the largest negative impact on investments (an increase equal to the interquartile range is associated with a lower investment rate equal to 36 and 41 per cent of its mean during the financial and the sovereign debt crisis, respectively). Overall our results indicate that higher ex-ante indebtedness represented a relevant and quantitatively similar constraint on investment dynamics during both periods of crisis (2007-2010; 2011-15). Instead, we do not find a significant relation in an expansionary period (2004-06), suggesting that more leveraged firms did not have lower investment rates.

The role of other variables is overall less important. Expected demand growth has a positive effect, albeit equal to around 1/3 of the one found for leverage. We also document a negative association between uncertainty and investment, even if the relation is not always statistically significant and the economic effect is even smaller. Finally, we find that profitability is positively correlated with investment only during the sovereign debt crisis: it is likely that self-financing became more binding for investment as profitability was lower due to the negative impact of the financial crisis.

We also evaluate the indirect impact of these variables on investment through firm survival, finding interesting and complementary results: there is no effect from expected demand growth and the role of leverage is limited; credit rationing and profitability play instead a key role. In this case, these results are qualitatively not different during the pre-crisis period.

These results are relevant from two related perspectives. First, leverage and expected demand growth affect investments of surviving firms and have a direct impact on economic growth during a crisis. Second, credit rationing and profitability affect investments indirectly, because part of the drop in aggregate

investments is due to the higher exit rate of firms, including bankruptcy; in turn the higher vulnerability of the corporate sector generates negative consequences on banks' balance sheets and financial stability.

The relevance of leverage suggests that supporting a rebalancing of firms' financial structure towards equity is an important policy measure. A step in this direction was represented by the introduction by the Italian Government at the end of 2011 of an allowance for corporate equity (ACE) to promote firms' capitalization through fiscal incentives.[17] Indeed, Branzoli and Caiumi (2018) find that in a broad sample of manufacturing companies, ACE substantially reduced leverage between 2011 and 2013.

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[17] Under this measure a notional return on new equity and on reinvested profit became deductible from corporate income tax, thus reducing the fiscal distortion between the cost of equity and the cost of debt.

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Tables

Table 1 Descriptive statistics

Panel A – Financial crisis (2007-2010; apart from average investment rate, values refer to 2006)

VARIABLES	mean	p50	sd	p10	p25	p75	p90	N
average investment rate (C)	5.380	3.550	6.580	0.360	1.440	7.380	13.09	3,015
leverage firm level (C)	26.95	26.54	18.57	0.680	10.84	41.14	52.12	3,015
leverage industry-size (C)	29.44	29.73	6.350	21.24	24.89	33.86	38.16	3,015
expected turnover growth (S)	5.530	4.520	9.860	-3.320	0.620	8.870	15.74	3,015
D(rationed) (C)	1.090	0	10.41	0	0	0	0	3,015
ebitda / assets (C)	8.780	8.060	7.650	0.770	4.490	12.42	18.21	3,015
log assets (C)	9.840	9.630	1.440	8.140	8.840	10.72	11.79	3,015
cash / assets (C)	5.820	2.800	7.650	0.120	0.720	7.630	15.77	3,015
lagged investment rate (C)	4.580	2.750	6.480	0.0200	0.900	6.260	11.96	3,015
value added / worker (S+C)	5.890	5.040	3.590	2.760	3.790	6.890	9.880	3,015
share of exported sales (S)	23.44	8	28.89	0	0	43.03	71.65	3,015
uncertainty (S)	7.700	6	6.320	2	3.250	10	16	820

Panel B – Sovereign debt crisis (2011-2015; apart from average investment rate, values refer to 2010)

VARIABLES	mean	p50	sd	p10	p25	p75	p90	N
average investment rate (C)	3.350	2.340	4.050	0.170	0.900	4.760	8	2,756
leverage firm level (C)	26.60	26.20	18.03	0.970	11.47	40.40	50.90	2,756
leverage industry-size (C)	29.90	30.17	6.220	21.95	25.02	33.86	38.99	2,756
expected turnover growth (S)	5.500	4.110	10.58	-4	0.0500	9.480	17.92	2,756
D(rationed) (C)	3.450	0	18.25	0	0	0	0	2,756
ebitda / assets (C)	7.240	6.540	7.150	-0.0200	3.270	10.68	16.15	2,756
log assets (C)	10.12	9.920	1.520	8.340	9.040	11.05	12.22	2,756
cash / assets (C)	5.650	2.300	7.930	0.0800	0.480	7.420	16.37	2,756
lagged investment rate (C)	3.860	2.250	5.390	0.120	0.750	5.250	9.810	2,756
value added / worker (S+C)	6.390	5.400	4.190	2.860	3.950	7.560	10.87	2,756
share of exported sales (S)	23.65	7.860	29.14	0	0	44.42	71.11	2,756
uncertainty (S)	8.210	6	7.680	1	3	10	20	1,462

Panel C – Pre crisis (2004-2006; apart from average investment rate, values refer to 2003)

VARIABLES	mean	p50	sd	p10	p25	p75	p90	N
average investment rate (C)	4.500	3.060	5.710	0.140	1.140	6.340	11.37	2,922
leverage firm level (C)	27.56	27.27	18.62	1.100	12.08	41.48	52.40	2,922
leverage industry-size (C)	29.47	29.73	6.500	21.10	24.89	33.86	38.16	2,922
expected turnover growth (S)	5.480	3.850	11.10	-4.610	0.250	9.030	16.96	2,922
D(rationed) (S)	2.360	0	15.19	0	0	0	0	2,922
ebitda / assets (C)	9.070	8.390	8.120	0.880	4.630	13	18.72	2,922
log assets (C)	9.690	9.500	1.400	8.040	8.700	10.53	11.60	2,922
cash / assets (C)	5.270	2.350	7.120	0.0900	0.540	7.180	14.61	2,922
lagged investment rate (C)	4.820	2.860	7.040	0.0500	0.970	6.350	12.62	2,922
value added / worker (S+C)	5.240	4.550	3.030	2.500	3.420	6.240	8.680	2,922
share of exported sales (S)	23.60	8.440	29.20	0	0	43.16	73.31	2,922
uncertainty (S)	8.350	6	7.360	2	3.500	10	18.40	872

The tables report descriptive statistics for all variables used in the empirical analysis over the three time spans considered in the empirical analysis. The source is Cerved (C) or the SISF (S). *average investment rate*: yearly average of the flows of tangible and intangible investment net of disinvestment over the reference period/total assets in the year before the reference period (e.g. 2006, 2010 and 2003); *leverage firm level*: financial debt/total assets; *leverage industry-size*: median leverage in the industry-size decile of the firm; *expected turnover growth*: firm expected growth of turnover in the following year; *D(rationed)* equals 1 if the firm reports to be strictly credit rationed, that is it would like more credit, would be ready to pay a higher interest rate and have been denied credit by banks; *ebitda / assets* is a measure of operating profitability; *log assets* is a measure of size; *cash / assets* is a measure of liquidity; *lagged investment rate* is the investment rate in the year before the reference period (e.g. 2006, 2010 and 2003); *value added / worker* is a measure of productivity (value added comes from Cerved, while the number of workers from SISF); *share of exported sales* is the share of exported turnover; *uncertainty*: difference between the maximum and the minimum expected growth rate of sales in the following year For further details see also section 2.

Table 2 Financial crisis – Average investment rate 2007-2010

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	-0.0134*		-0.213**	
	(0.00780)		(0.105)	
expected turnover growth	0.0624***	0.0612***	0.0867***	0.120***
	(0.0111)	(0.0111)	(0.0216)	(0.0264)
log assets	-0.757***	-0.513***	-0.650***	-0.644
	(0.134)	(0.126)	(0.142)	(0.443)
D(rationed)	-0.0196***	-0.0211***	-0.00656	0.0683**
	(0.00634)	(0.00636)	(0.0104)	(0.0306)
lagged investment rate	0.149***	0.150***	0.165***	0.0704
	(0.0247)	(0.0248)	(0.0243)	(0.0444)
ebitda / assets	0.0904***	0.0987***	-0.0222	-0.567***
	(0.0205)	(0.0222)	(0.0602)	(0.0679)
cash holdings / assets	-0.00847	-8.33e-05	-0.139*	-0.654***
	(0.0180)	(0.0166)	(0.0692)	(0.0456)
value added / worker	0.00272	0.00221	0.0685	0.311**
	(0.0614)	(0.0614)	(0.0852)	(0.146)
share of exported sales	0.00726	0.00795*	0.00750	-0.00211
	(0.00453)	(0.00445)	(0.00720)	(0.0197)
leverage industry-size		-0.181**		0.848***
		(0.0830)		(0.143)
Observations	3015	3015	3015	3015
R-squared	0.160	0.164		0.244
F-test				35.02

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the investment rate. Firm-level controls are measured as of 2006, the investment rate is the average investment between 2007 and 2010 normalized by firm-level assets as of 2006. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3 Sovereign debt crisis – Average investment rate 2011-2015

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	-0.00533*		-0.157***	
	(0.00307)		(0.0509)	
expected turnover growth	0.0401***	0.0401***	0.0484***	0.0533*
	(0.00884)	(0.00895)	(0.0102)	(0.0305)
log assets	-0.115*	-0.0192	0.0217	0.261
	(0.0595)	(0.0642)	(0.109)	(0.385)
D(rationed)	-0.00232	-0.00209	0.00225	0.0277
	(0.00377)	(0.00378)	(0.00581)	(0.0199)
lagged investment rate	0.148***	0.147***	0.170***	0.148**
	(0.0268)	(0.0268)	(0.0254)	(0.0563)
ebitda / assets	0.135***	0.139***	0.0759***	-0.401***
	(0.0191)	(0.0194)	(0.0217)	(0.0683)
cash holdings / assets	0.00916	0.0132	-0.0993**	-0.718***
	(0.00956)	(0.00996)	(0.0382)	(0.0393)
value added / worker	-0.0756***	-0.0763***	-0.0576**	0.120
	(0.0226)	(0.0228)	(0.0244)	(0.149)
share of exported sales	0.00905**	0.00919**	0.0109**	0.0109
	(0.00346)	(0.00344)	(0.00501)	(0.0193)
leverage industry-size		-0.105***		0.672***
		(0.0368)		(0.156)
Observations	2756	2756	2756	2756
R-squared	0.206	0.209		0.230
F-test				18.47

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the investment rate. Firm-level controls are measured as of 2010, the investment rate is the average investment between 2011 and 2015 normalized by firm-level assets as of 2010. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 Uncertainty and average investment rate

	Financial crisis (2007-2010)				Sovereign debt crisis (2011-2015)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	ols	itt	iv-2stage	iv-1stage	ols	itt	iv-2stage	iv-1stage
leverage firm level	-0.0355***		-0.180		-0.00851		-0.175**	
	(0.0125)		(0.235)		(0.00687)		(0.0736)	
expected turnover growth	0.0425*	0.0391*	0.0588	0.109*	0.0523***	0.0509***	0.0674***	0.0941**
	(0.0210)	(0.0211)	(0.0394)	(0.0598)	(0.0129)	(0.0127)	(0.0135)	(0.0442)
log assets	-0.491**	-0.347*	-0.630	-1.574***	-0.200***	-0.0785	0.0246	0.589
	(0.217)	(0.202)	(0.386)	(0.454)	(0.0667)	(0.0780)	(0.158)	(0.529)
D(rationed)	-0.0167	-0.0176	-0.00756	0.0557	0.00177	0.00212	0.00584	0.0213
	(0.0119)	(0.0131)	(0.0148)	(0.0565)	(0.00484)	(0.00544)	(0.00691)	(0.0232)
lagged investment rate	0.114**	0.112**	0.131***	0.105	0.127***	0.126***	0.171***	0.260***
	(0.0455)	(0.0459)	(0.0470)	(0.0938)	(0.0364)	(0.0364)	(0.0362)	(0.0919)
ebitda / assets	0.144***	0.170***	0.0273	-0.794***	0.0986***	0.103***	0.0491*	-0.306***
	(0.0349)	(0.0317)	(0.184)	(0.137)	(0.0197)	(0.0201)	(0.0287)	(0.0812)
cash holdings / assets	0.0123	0.0298	-0.0634	-0.518***	0.0107	0.0174	-0.114*	-0.751***
	(0.0309)	(0.0326)	(0.118)	(0.0742)	(0.0131)	(0.0123)	(0.0578)	(0.0387)
value added / worker	-0.141*	-0.152**	-0.0775	0.413	-0.0131	-0.0121	-0.0271	-0.0860
	(0.0751)	(0.0693)	(0.138)	(0.325)	(0.0348)	(0.0345)	(0.0569)	(0.224)
share of exported sales	0.00551	0.00467	0.00569	0.00568	0.0103**	0.0107***	0.0135**	0.0163
	(0.00456)	(0.00482)	(0.00693)	(0.0324)	(0.00416)	(0.00383)	(0.00620)	(0.0237)
uncertainty	-0.0504	-0.0551*	-0.0417	0.0750	-0.0300*	-0.0295*	-0.0271	0.0136
	(0.0311)	(0.0301)	(0.0406)	(0.0760)	(0.0162)	(0.0158)	(0.0206)	(0.0714)
leverage industry-size		-0.178		0.990***		-0.123***		0.701***
		(0.208)		(0.286)		(0.0363)		(0.196)
Observations	820	820	820	820	1462	1462	1462	1462
R-squared	0.274	0.267		0.358	0.235	0.238		0.270
F-test				11.95				12.77

The table shows cross-sectional regressions of firm-level controls (in particular leverage and uncertainty; for a complete definition of the variables see Table 1) on the investment rate. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. The first four columns replicate Table 2; the following four replicate Table 3. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 – Interactions between leverage and other variables (IV regressions)

VARIABLES	(1) Financial crisis	(2) Sovereign debt crisis
leverage firm level	-0.195*	-0.120
	(0.0972)	(0.0902)
leverage*exp demand	-0.0174**	-0.00621
	(0.00854)	(0.0162)
leverage*ebitda/assets	-0.0108	-0.00721
	(0.0165)	(0.00826)
leverage*Rationed	0.00272**	-0.0157
	(0.00134)	(0.0444)
expected turnover growth	0.119***	0.0482**
	(0.0304)	(0.0183)
ebitda / assets	-0.0591	0.0414
	(0.144)	(0.0644)
log assets	-0.857***	0.0526
	(0.230)	(0.376)
D(rationed)	-0.100**	0.510
	(0.0430)	(1.452)
lagged investment rate	0.183***	0.173***
	(0.0258)	(0.0396)
cash holdings / assets	-0.132	-0.0915
	(0.0800)	(0.0730)
value added / worker	0.0933	-0.0383
	(0.103)	(0.0344)
share of exported sales	0.00466	0.00877
	(0.00675)	(0.0130)
Observations	3015	2756

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the investment rate, including also the interactions between leverage and expected demand, Ebitda/assets, and the dummy for being rationed. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Both columns show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm (see column 3 of Table 2 and 3, respectively). Column 1 refers to the financial crisis period (2007-2010), column 2 to the sovereign crisis period (2011-2015). Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 Pre-crisis – Average investment rate 2004-2006

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	-0.00400		-0.00626	
	(0.00573)		(0.0830)	
expected turnover growth	0.0178	0.0176	0.0179	0.0505*
	(0.0107)	(0.0107)	(0.0117)	(0.0274)
log assets	-0.149	-0.148	-0.147	0.208
	(0.109)	(0.119)	(0.129)	(0.477)
D(rationed)	-0.0127**	-0.0130**	-0.0126	0.0545**
	(0.00565)	(0.00563)	(0.00828)	(0.0218)
lagged investment rate	0.179***	0.179***	0.179***	0.0260
	(0.0218)	(0.0219)	(0.0221)	(0.0468)
ebitda / assets	0.116***	0.118***	0.115***	-0.378***
	(0.0167)	(0.0166)	(0.0372)	(0.0645)
cash holdings / assets	-0.00821	-0.00545	-0.00976	-0.688***
	(0.0128)	(0.0132)	(0.0630)	(0.0412)
value added / worker	-0.0479	-0.0485	-0.0475	0.153
	(0.0480)	(0.0484)	(0.0536)	(0.200)
share of exported sales	-0.00225	-0.00230	-0.00221	0.0132
	(0.00343)	(0.00338)	(0.00362)	(0.0179)
leverage industry-size		-0.00392		0.626***
		(0.0516)		(0.146)
Observations	2922	2922	2922	2922
R-squared	0.160	0.159		0.239
F-test				18.28

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the investment rate. Firm-level controls are measured as of 2003, the investment rate is the average investment between 2004 and 2006 normalized by firm-level assets as of 2003. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7 Panel – Average investment rate (2003-2015)

VARIABLES	(1) Investment rate	(2) Investment rate	(3) Investment rate	(4) Investment rate	(5) Investment rate	(6) Investment rate
leverage firm level	-0.0241**	-0.0252**	-0.0168*	-0.0234**	-0.0241**	-0.00701
	(0.00883)	(0.00845)	(0.00802)	(0.00968)	(0.00911)	(0.0125)
expected turnover growth	0.0172***	0.0179***	0.0156**	0.0201***	0.0192***	0.00415
	(0.00292)	(0.00301)	(0.00606)	(0.00561)	(0.00528)	(0.0105)
ebitda / assets	0.0383*	0.0365*	0.0428**	0.0491**	0.0498**	0.0544*
	(0.0180)	(0.0172)	(0.0174)	(0.0186)	(0.0193)	(0.0276)
log assets	-4.426***	-4.388***	-4.413***	-4.519***	-4.386***	-4.425***
	(0.962)	(0.901)	(1.006)	(0.963)	(0.910)	(0.946)
cash holdings / assets	0.0660***	0.0685***	0.0658***	0.0757***	0.0775***	0.0757***
	(0.0131)	(0.0134)	(0.0127)	(0.0189)	(0.0192)	(0.0196)
D(rationed)	-0.00267	-0.00247	-0.00407	-0.00496*	-0.00494*	-0.00359
	(0.00245)	(0.00222)	(0.00770)	(0.00231)	(0.00242)	(0.00784)
share of exported sales	-1.66e-05	0.000870	-1.61e-05	0.0111*	0.0101	0.00864
	(0.00403)	(0.00380)	(0.00407)	(0.00555)	(0.00597)	(0.00616)
value added / worker	0.0509	0.0545	0.0489	0.0291	0.0290	0.0261
	(0.0353)	(0.0352)	(0.0359)	(0.0500)	(0.0457)	(0.0460)
lagged investment rate		-0.0120			-0.0492	-0.0496
		(0.0388)			(0.0334)	(0.0330)
uncertainty				-0.00656	-0.00886	0.00957
				(0.00778)	(0.00790)	(0.0107)
leverage*fin cris			-0.00674			-0.0179
			(0.00863)			(0.0115)
expected turnover growth*fin cris			-0.00216			0.0116
			(0.00739)			(0.0116)
ebitda / assets*fin cris			-0.00316			0.00904
			(0.0271)			(0.0312)
D(rationed)*fin cris			0.00662			0.00287
			(0.0116)			(0.00747)
uncertainty*fin cris						-0.0281**
						(0.0122)
leverage*sov debt			-0.0199**			-0.0383**
			(0.00822)			(0.0137)
expected turnover growth*sov debt			0.0111			0.0414**
			(0.00947)			(0.0180)
ebitda / assets*sov debt			-0.00875			-0.0382
			(0.0269)			(0.0408)
D(rationed)*sov debt			-0.000944			-0.00602
			(0.00796)			(0.00849)
uncertainty*sov debt						-0.00441
						(0.00486)
Observations	30051	29541	30051	9986	9828	9828
R-squared	0.408	0.410	0.409	0.551	0.555	0.557

The table shows panel regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the average investment rate. All regressions include firms, year, industry (2-digit Nace rev. 2007) and province fixed effects. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8 - Average investment rate excluding recovery years

	Financial crisis excluding recovery (2007-2009)				Sovereign debt crisis excluding recovery (2011-2014)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	ols	itt	iv-2stage	iv-1stage	ols	itt	iv-2stage	iv-1stage
leverage firm level	-0.0126		-0.202		-0.00903**		-0.195***	
	(0.00809)		(0.120)		(0.00386)		(0.0647)	
expected turnover growth	0.0684***	0.0672***	0.0901***	0.113***	0.0446***	0.0442***	0.0558***	0.0596**
	(0.0116)	(0.0118)	(0.0221)	(0.0257)	(0.00747)	(0.00749)	(0.0109)	(0.0267)
log assets	-0.878***	-0.648***	-0.767***	-0.586	-0.152**	-0.0475	0.0391	0.444
	(0.169)	(0.165)	(0.185)	(0.456)	(0.0578)	(0.0626)	(0.127)	(0.433)
D(rationed)	-0.00368	-0.00482	0.00559	0.0514**	-0.00314	-0.00301	0.00319	0.0318*
	(0.00925)	(0.00920)	(0.0130)	(0.0252)	(0.00430)	(0.00423)	(0.00620)	(0.0169)
lagged investment rate	0.159***	0.159***	0.171***	0.0559	0.142***	0.139***	0.173***	0.174***
	(0.0227)	(0.0228)	(0.0245)	(0.0455)	(0.0275)	(0.0277)	(0.0251)	(0.0507)
ebitda / assets	0.0673***	0.0748***	-0.0407	-0.571***	0.122***	0.128***	0.0501*	-0.397***
	(0.0209)	(0.0222)	(0.0684)	(0.0664)	(0.0174)	(0.0174)	(0.0266)	(0.0648)
cash holdings / assets	-0.00326	0.00439	-0.129	-0.657***	0.00686	0.0137	-0.127**	-0.723***
	(0.0197)	(0.0187)	(0.0783)	(0.0437)	(0.0121)	(0.0115)	(0.0493)	(0.0395)
value added / worker	0.0518	0.0518	0.111	0.292*	-0.0611***	-0.0620***	-0.0398	0.114
	(0.0645)	(0.0642)	(0.0907)	(0.149)	(0.0213)	(0.0218)	(0.0273)	(0.152)
share of exported sales	0.00603	0.00668	0.00711	0.00211	0.00691*	0.00704*	0.00903	0.0102
	(0.00545)	(0.00545)	(0.00705)	(0.0196)	(0.00362)	(0.00357)	(0.00543)	(0.0200)
leverage industry-size		-0.170*		0.842***		-0.119***		0.611***
		(0.0914)		(0.145)		(0.0389)		(0.163)
Observations	3153	3153	3153	3153	2871	2871	2871	2871
R-squared	0.139	0.141		0.242	0.192	0.195		0.230
F-test				33.50				14.12

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the investment rate. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. The first four columns replicate Table 2 but refer to 2007-2009; the following four replicate Table 3, but refer to 2011-14. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9 Financial crisis – Probability of survival between 2007 and 2010

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	-0.0769*		0.220	
	(0.0451)		(0.352)	
expected turnover growth	0.0253	0.0167	-0.00535	0.100***
	(0.0612)	(0.0606)	(0.0589)	(0.0223)
log assets	1.326**	1.042	1.132*	-0.411
	(0.640)	(0.731)	(0.640)	(0.426)
D(rationed)	-0.210**	-0.211**	-0.215**	0.0181
	(0.0823)	(0.0824)	(0.0828)	(0.0164)
lagged investment rate	0.259**	0.253**	0.241**	0.0573
	(0.0965)	(0.0981)	(0.104)	(0.0421)
ebitda / assets	0.489***	0.527***	0.643***	-0.528***
	(0.145)	(0.143)	(0.236)	(0.0655)
cash holdings / assets	-0.0456	0.00302	0.137	-0.610***
	(0.0914)	(0.0797)	(0.235)	(0.0380)
value added / worker	-0.232	-0.253	-0.304	0.231*
	(0.275)	(0.274)	(0.272)	(0.132)
share of exported sales	-0.0226	-0.0243	-0.0258	0.00675
	(0.0224)	(0.0227)	(0.0244)	(0.0199)
leverage industry-size		0.165		0.753***
		(0.256)		(0.145)
Observations	3591	3591	3591	3591
R-squared	0.086	0.084		0.227
F-test				27.02

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the probability of survival between 2007 and 2010. Firm-level controls are measured as of 2006. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10 Sovereign debt crisis – Probability of survival between 2011 and 2015

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	-0.0983**		0.0359	
	(0.0440)		(0.403)	
expected turnover growth	0.0329	0.0241	0.0210	0.0855***
	(0.0680)	(0.0705)	(0.0893)	(0.0289)
log assets	1.129*	0.991	0.974	0.454
	(0.623)	(0.684)	(0.778)	(0.383)
D(rationed)	-0.151***	-0.156***	-0.157***	0.0441***
	(0.0417)	(0.0411)	(0.0411)	(0.0124)
lagged investment rate	0.141	0.125	0.119	0.170***
	(0.147)	(0.143)	(0.188)	(0.0508)
ebitda / assets	0.485***	0.518***	0.531***	-0.359***
	(0.154)	(0.152)	(0.192)	(0.0641)
cash holdings / assets	0.142**	0.212***	0.237	-0.710***
	(0.0693)	(0.0749)	(0.288)	(0.0390)
value added / worker	-0.111	-0.116	-0.118	0.0644
	(0.240)	(0.243)	(0.242)	(0.144)
share of exported sales	0.0161	0.0141	0.0134	0.0186
	(0.0329)	(0.0328)	(0.0341)	(0.0190)
leverage industry-size		0.0239		0.665***
		(0.268)		(0.152)
Observations	3390	3390	3390	3390
R-squared	0.090	0.088		0.229
F-test				19.09

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the probability of survival between 2011 and 2015. Firm-level controls are measured as of 2006. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11 Pre crisis – Probability of survival between 2004 and 2006

VARIABLES	(1) ols	(2) itt	(3) iv-2stage	(4) iv-1stage
leverage firm level	0.0680**		0.222	
	(0.0315)		(0.261)	
expected turnover growth	0.0125	0.0152	0.00511	0.0454*
	(0.0443)	(0.0436)	(0.0490)	(0.0241)
log assets	1.043*	0.894	0.861	0.149
	(0.613)	(0.748)	(0.830)	(0.473)
D(rationed)	-0.166***	-0.163***	-0.176***	0.0595***
	(0.0504)	(0.0504)	(0.0538)	(0.0138)
lagged investment rate	0.0966	0.0971	0.0936	0.0160
	(0.0914)	(0.0910)	(0.0923)	(0.0456)
ebitda / assets	0.406***	0.381***	0.463***	-0.370***
	(0.126)	(0.120)	(0.136)	(0.0663)
cash holdings / assets	0.0764	0.0304	0.181	-0.680***
	(0.0998)	(0.101)	(0.220)	(0.0413)
value added / worker	-0.365	-0.358	-0.389	0.143
	(0.366)	(0.363)	(0.345)	(0.195)
share of exported sales	-0.00206	-0.00156	-0.00423	0.0120
	(0.0248)	(0.0244)	(0.0232)	(0.0176)
leverage industry-size		0.141		0.637***
		(0.152)		(0.145)
Observations	3321	3321	3321	3321
R-squared	0.069	0.068		0.236
F-test				19.37

The table shows cross-sectional regressions of firm-level controls (in particular leverage; for a complete definition of the variables see Table 1) on the probability of survival between 2004 and 2006. Firm-level controls are measured as of 2006. All regressions include industry (2-digit Nace rev. 2007) and province fixed effects. Column 1 shows OLS estimates. Column 2 shows OLS estimates including the median leverage in the industry-size decile of the firm. Columns 3 and 4 show IV estimates for leverage, where the instrument is the median leverage in the industry-size decile of the firm. Column 3 shows the second stage, column 4 shows the first-stage. Standard errors double clustered at the industry and province level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A.1 Expected vs actual turnover growth

a) Descriptive statistics (2003-2015)

variable	mean	p50	sd	p10	p25	p75	p90	N
Turnover growth (Cerved)	1.900	1.580	20.44	-20.09	-7.430	10.43	22.92	43,071.00
Expected Turnover growth (SISF)	3.360	2.680	12.11	-8.760	-0.380	7.420	15.28	43,071.00

b) Regression Analysis (2003-2015) – Panel with firm fixed effect

	(1)
VARIABLES	Turnover growth
Expected Turnover growth	0.887***
	(0.0133)
Constant	-1.084***
	(0.0448)
Observations	43071
Number of firms	8582
R-squared	0.241

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.2 Correlation matrices

Panel A – Financial crisis (2007-2010; apart from average investment rate, values refer to 2006)

	average investment rate	leverage firm level	leverage industry-size	expected turnover growth	D(rationed)	ebitda / assets	log assets	cash / assets	lagged investment rate	value added / worker	share of exported sales
average investment rate	1										
leverage firm level	-0.0605	1									
leverage industry-size	-0.0560	0.232	1								
expected turnover growth	0.0798	0.0792	-0.00250	1							
D(rationed)	-0.0362	0.0609	-0.0230	0.0375	1						
ebitda / assets	0.157	-0.260	-0.0484	-0.0456	-0.0808	1					
log assets	-0.151	0.102	0.278	0.0391	-0.00420	-0.0828	1				
cash / assets	0.0228	-0.336	-0.112	-0.0454	-0.0398	0.217	-0.105	1			
lagged investment rate	0.195	0.0192	-0.0310	0.0541	0.0214	0.118	-0.0189	-0.0791	1		
value added / worker	0.00570	-0.0574	0.127	-0.0366	-0.0430	0.478	0.447	0.0515	0.0400	1	
share of exported sales	-0.0316	-0.0109	0.0996	0.0758	-0.0205	0.0536	0.192	0.0766	-0.0263	0.0991	1

Panel B – Sovereign debt crisis (2011-2015; apart from average investment rate, values refer to 2010)

	average investment rate	leverage firm level	leverage industry-size	expected turnover growth	D(rationed)	ebitda / assets	log assets	cash / assets	lagged investment rate	value added / worker	share of exported sales
average investment rate	1										
leverage firm level	-0.0745	1									
leverage industry-size	-0.0790	0.175	1								
expected turnover growth	0.0894	0.0654	0.0259	1							
D(rationed)	-0.0218	0.0644	-0.0293	0.0478	1						
ebitda / assets	0.251	-0.212	-0.0280	-0.0926	-0.107	1					
log assets	-0.0574	0.0962	0.173	0.0564	0.00560	-0.0192	1				
cash / assets	0.0822	-0.366	-0.122	-0.0392	-0.0621	0.213	-0.0743	1			
lagged investment rate	0.267	0.0225	-0.0300	0.0329	-0.00930	0.117	-0.0460	0.00500	1		
value added / worker	0.0515	-0.0501	0.0748	-0.0299	-0.0767	0.465	0.460	0.0780	0.0153	1	
share of exported sales	0.0365	-0.000200	0.105	0.142	-0.0104	0.0293	0.199	0.0381	0.00250	0.105	1

Panel C – Pre crisis (2004-2006; apart from average investment rate, values refer to 2003)

	average investment rate	leverage firm level	leverage industry-size	expected turnover growth	D(rationed)	ebitda / assets	log assets	cash / assets	lagged investment rate	value added / worker	share of exported sales
average investment rate	1										
leverage firm level	-0.0652	1									
leverage industry-size	-0.0504	0.259	1								
expected turnover growth	0.0471	0.0454	-0.00810	1							
D(rationed)	-0.0315	0.0718	-0.0180	0.0700	1						
ebitda / assets	0.171	-0.226	-0.0298	-0.103	-0.0808	1					
log assets	-0.0723	0.148	0.320	-0.0153	-0.0123	-0.0719	1				
cash / assets	0.0204	-0.322	-0.104	-0.0474	-0.0546	0.239	-0.0982	1			
lagged investment rate	0.268	-0.0177	-0.0135	0.0822	0.0371	0.117	-0.0155	0.000900	1		
value added / worker	0.0469	-0.0256	0.147	-0.0557	-0.0537	0.477	0.424	0.0695	0.0414	1	
share of exported sales	-0.0678	0.0173	0.0778	-0.00800	0.0198	0.0300	0.152	0.0784	-0.0371	0.0456	1

The tables report the correlation between the variables defined in Table 1 over the three time spans considered in the empirical analysis.

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