Firm's investment and exit decisions under imperfect capital market and uncertain macroeconomic environment: The case of Vietnam

TRINH Quang Long
National Graduate Institute for Policy Studies (GRIPS, Japan)
and Central Institute for Economic Management (CIEM, Vietnam)
with
Tetsushi SONOBE
National Graduate Institute for Policy Studies (GRIPS, Japan)

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Abstract

This paper examines Vietnamese firms' investment and exit decision under the imperfect capital market and uncertain macroeconomic environment. We also investigate the heterogeneity, caused by firms' ownership type, in response to the uncertainty. We use a panel data of small firms collected from 2004 to 2011, a period with highly uncertain macroeconomic condition in Vietnam. We use 36-month rolling standard deviation of consumer price index as proxy for macroeconomic uncertainty. The idiosyncratic uncertainty is measured by the firm-level profit uncertainty. The results show that idiosyncratic uncertainty has negative and statistically significant effects on production investment rate. But it does not have any effects on firms' non-production investment rate. We also find evidence that macroeconomic uncertainty does not have any statistically significant effects on firms' production investment. It, however, has a positive effect on non-production investment rate as we control for the unobserved changes in industry-specific and province-specific characteristics. The empirical evidence also shows a significantly heterogeneous relationship between investment and uncertainty among different types of firms. The results also suggest that imperfect capital market plays a significant role in firm's investment decision. For exit decision, we find that only macroeconomic uncertainty have statistically significant effects on firm's exit decision.

Key words: investment, exit, survival, uncertainty, small and medium enterprises, Vietnam,

I. Introduction

Private investment plays an important role in the development process, at both macro and micro level. This makes investigating investment decision a major subject of methodological and empirical concerns. Given the fact that firms expose to many types of uncertainty, which may in turns affect firms' business decision, various theories have tried to explain the investment decision under uncertainty. Some theories show that uncertainty has negative effects on investment due to irreversibility of investment, higher cost of finance and firm's manager risk aversion and ambiguity aversion (Dixit and Pindyck, 1994; Abel and Eberly, 1996; Bernanke 1998) while some others predict that uncertainty have positive effects on investment (Oi, 1961; Hartman, 1972; Abel, 1983). This ambiguity has attracted a large number of empirical studies. Most of the empirical studies using large and listed firm level data in developed countries found a negative or weak relationship between uncertainty and investment (e.g. Leahy and Whited, 1996; Bulan, 2005, Shaanan, 2005; Bloom, Bond and Van Reenen 2007; Baum et al 2008, 2010, Ghosal Loungani, 2000, Guiso and Parigi 1999). Meanwhile, for developing countries, there are only a few studies that explore the effect of uncertainty on investment using firm-level data (e.g Pattillo 1998; Le et al. 2004; Leefmans 2011; Kandilov and Leblebicioglu 2011, Bo and Zhang; 2002; Bigsten et al 2001), especially among small, family-based firms (Bianco et al, 2013). In fact, many studies that investigate the determinants of investment in developing countries focus more on the role of the imperfect capital market, rather than the role of uncertainty. Although the former factor is serious in developing economies, the later also plays an important role in explaining low investment rate in these economies, given the fact that firms operating in such economies are likely to face with higher and more types of uncertainty than their counterparts in developed economies (Bloom, 2014).

This paper attempts to explore how Vietnamese small and medium firms' investment and

exit decision are correlated with uncertainty under the imperfect capital market. We also explore whether firms' different types of investment and exit decisions are heterogeneous in responses to uncertainty given their ownership types. To do so, we use monthly consumer price index to calculate macroeconomic uncertainty. Meanwhile, we use the yearly accounting data to calculate the firms' idiosyncratic uncertainty.

Our dataset provides details about the firms' investment activity in two-year period. The panel nature of data also allows us to estimate the impact of investment and uncertainty by using the random-effect tobit method while the heteroskedastic probit method is used to explore the effect of uncertainty on exit decision. We categorize investment items into two categories: production investment and non-production investment. Then, we calculate two investment rates: production investment rate and non-production investment rate. For the exit decisions, we use two definitions to identify an exit firm: one including firms that confirmed to be exit from the market and one including firms that either confirmed to exit or withdraw from the surveys.

The empirical results shows that only idiosyncratic uncertainty has negative effects on production investment but has not correlated with non-production investment. Meanwhile, macroeconomic uncertainty does not have a statistically significant correlation with both types of investment. But as we allow the industry and province to change overtime, the coefficient on macroeconomic uncertainty becomes positive and statistically significant on non-production investment equation. The evidence also shows a significantly heterogeneous in response to different types of uncertainty among firms. Corporate firms are more sensitive to the idiosyncratic uncertainty. We also find that firms with more connections to banking system are likely to have higher investment rates. With regards to exit decision, we find that idiosyncratic uncertainty does not have a statistically significant effect, but higher macroeconomic uncertainty has a positive effect on firm's exit decision.

This paper contributes to literature in several ways. First, this paper adds new evidence on the relationship between investment and uncertainty (both idiosyncratic and macro level) at firm level in developing countries, especially for the small firms. As mentioned above, while there is extensive literature on the relationship of investment and uncertainty at firm level in matured economies, only few studies attempt to explore this relationship using firm-level data from developing economies, where firms tend to expose to greater and more diverged uncertainty. A notable feature of these studies is the use of ex-ante measure of uncertainty. Although there are some advantages of using this measure of uncertainty (Le et al. 2004), it may be subject to potential endogeneity problem (such as the respondent's unobserved characteristics that may both have effects their investment activity and their projection of growth), partly because the data in such studies is cross-sectional. In reality, collecting such panel data is rare and costly. Furthermore, due to limited data, all the investment studies in developing countries look at the relationship between uncertainty and fixed-asset investment. To our best knowledge, there is no empirical evidence on the relationship between uncertainty and financial investment.

One interesting aspect is that firms in our studies operate in a rather turbulent macroeconomic environment. In fact, our studied period is from 2007-2011, a period is considered to be the most uncertain one after Vietnam's reform in 1989. The uncertainty is partly due to the internal macroeconomic issues and partly severe effects of the global economic crisis in 2008. Domestically, the inflation increased rapidly from 7% in 2006 to 21% in 2008 and continued to be at the double digit from 2009 through 2011 (See Figure 1). In addition, given its larger exposure to the global economy, especially after joining the WTO, the global financial crisis in 2008 also has strong and lasting effects on the local economy with sharp decline in FDI and export growth. This has caused many firms to exit the market or temporarily stop their production (CIEM, 2013). However, to our knowledge,

there are not any studies to explore how such unfavorable macroeconomic condition correlates with firms' investment and exit decision in Vietnam.

This paper also contributes to the literature on investment under imperfect capital market. Most of previous literature on the effect of imperfect capital market on investment is based on the idea that under imperfect capital market, investment is only sensitive to internal funds, which are usually measured by the cash flow (Reyes et al 2012). However, Kaplan and Zingales (1997) and Demir (2009) argues that a firm's investment-cash flows sensitivities does not fully reflect its financial constraints and that the internal funds is only the necessary but not a sufficient condition for investment. In this paper, we use both the cash flow as a proxy for internal funds and some indicators as proxies for the ability to access to external funds to explore how firm's investment are likely to be affected by such factor.

This paper is also relating to the literature on the firms' exit decision. A large number of studies have find out factors that firms withdraw from the market. Only a small number of researches focus on how firm-specific and macroeconomic uncertainty affects the exit decision, especially for firms in developing countries.

The paper is organized as follows. Section 2 will review theoretical and empirical literature. Our empirical approach will be presented in section 3. Data source and some descriptive statistics are provided in Section 4. Estimation results are reported in section five. And conclusion follows in section six.

II. Literature review

II.1. Theoretical foundation

There is an extensive literature on the relationship between investment and uncertainty. But, theoretically, how the uncertainty affects investment is inconclusive. According to the standard investment theory, firms would only invest in a project as long as the present value

of expected cash flow gained from that project exceeds the total costs of investment. Thus, the value of total costs can be considered as the threshold value of investment. Although a higher degree of uncertainty may increase the threshold value of investment, and thus reduce the willingness to invest, the uncertainty-investment relationship may be more complex. This relationship may depend on the model specifications and the underlying assumptions with respect to the risk behavior of the investor, the extent of competition in his output markets, the production technologies and the shape of the adjustment costs (Le et al., 2004).

With regards to risk behavior of the investors, Nickell (1978) argues that a risk adverse agent will invest less facing higher uncertainty, while a risk-taking agent will invest more the higher the uncertainty. Similarly, according to Nakamura (1999), uncertainty may have positive, negative or no effects on investment, depending on the trade off between the degree of relative risk-aversion and the elasticity of output to labor in the production function. This suggests that risk aversion discourages investment.

Hartman (1972) and Abel (1993) find that under perfect competition, constant returns to scale production function, higher uncertainty encourages firms to invest more since the marginal product of capital is a convex function of stochastic variables. However, if the assumptions of perfect competition and constant returns to scale are relaxed, the effect of uncertainty on investment is negative (Abel and Eberly, 1994; Caballero, 1991). Abel and Eberly (1999) argue that the relationship between investment and uncertainty may be represented by an inverted-U curve. This is due to the fact that uncertainty has both a user-cost and a so-called hangover effect on investment. On the other hand, uncertainty increases the user costs of capital in the short run, which reduces investment in the presence of uncertainty. On the other hand, however, if disinvestment during adverse shocks (for instance in demand) are difficult due to the irreversibility of the investment, a firm will have higher than desired levels of investment in the longer run, i.e. the hangover effect. Thus, the

user-cost and hangover effects influence the investment-uncertainty relationship in opposite directions and this may result in an inverted U-shaped relationship (Abel and Eberly, 1999).

Since the late 1980s, several authors have stressed the importance of investment irreversibility and the impact of this on the investment-uncertainty relationship (Bernanke, 1983; MacDonald and Siegel, 1986; Bertola and Caballero, 1994; and Dixit and Pindyck, 1994). This class of real-option theories argues that firms have a series of put-options on potential new investments. As the uncertainty is high, the option-value of delay is also high. Thus uncertainty makes firms cautious about actions like investment which adjustment costs often make expensive to reverse. However, real-option effects also depend on firm's ability to wait (Bloom, 201?). If the cost of waiting is too high, it will break the negative real-options effect of uncertainty on investment. Furthermore, real options require that actions taken now influence the returns to actions taken later so it's required that firms sell into imperfectly competitive markets and/or operate with a decreasing return to scale technology.

Another factor that also influences the relationship between uncertainty and investment is the financial constraint. According to Aizeman and Marion (1999), nonlinear budget constraints and the consequences of capital market imperfection may lead to a negative effect of uncertainty on investment. Furthermore, Minton and Schrand (1999) assert that costs of external financing are positively related to cash flow volatility. Since cost of external financing are generally higher under capital market imperfections, they provide indirect evidence that capital market imperfections reinforce the negative effect of uncertainty on investment.

II.2. Empirical literature

Despite the theoretically inclusive relationship between investment and uncertainty, the empirical studies generally have found a negative effect of uncertainty on investment, even

when the irreversibility of investment is taken into account (Bo, 2001). However, comparing the findings from these studies seems to be difficult.

First, these studies use different measurements of uncertainty. At least there are four approaches to calculate proxy for measurement of the uncertainty: (i) using the unconditional volatility of a variable that is potentially of crucial for investment decisions as proxy for uncertainty (Bell and Campa, 1997; Pindyck, 1986; Ogawa and Suzuki, 2000); (ii) using conditional variances of such crucial variables as proxies for uncertainty (Episcopos, 1995, Price, 1996); (iii) firms' perception of future growth of a particular variable that is important for firm's investment decision as proxy for uncertainty (Guiso and Parigi, 1999; Pattillo, 1998 and Le et al., 2004) and (iv) using the volatility of a particular variable using AR model residuals (Ghosal and Loungani 1996; Leahy and Whited, 1996). In general, variables that have been considered as being crucial in empirical studies include exchanges rates, input put prices, share returns, output demand, output prices, profit and demand shocks (Stein and Stone, 2013).

Second, different aggregate levels are used in empirical studies to explore the relationship between investment and uncertainty. Some studies use data at the country level (Goel and Ram, 2001). Other studies use aggregate data at the industrial sector level (Bell and Campa, 1997; Goel and Ram 1999). Finally, several studies make use of firm-level data (Bo and Zhang, 2002, Bigsten et al, 2001; Ogawa and Suzuki, 2000; Guiso and Parigi, 1999; Pattilo, 1998; and Le et al. 2004).

Third, investment irreversibility is also measured differently from studies to studies. Some studies use information on the degree of access to some second-hand markets of used capital (Guiso and Parigi, 1999) or the ratio of the resale value to the replacement value of capital (Pattilo, 1998). Some measured indirectly by defining different types of investment

for which different degrees of irreversibility are assumed, such as R&D investment versus non-R&D investment (Goel and Ram, 2001), greenfield investment versus capacity expansion (Bell and Campa, 1997) and materials versus machinery industry (Ogawa and Suzuki, 2000).

Furthermore, it is also difficult to identify which approach is the most suitable one, except for using the firm level data. In fact, using firm level data allows one to capture idiosyncratic events that potentially affect firms' investment decision. Even though there are some arguments that it is more appropriate to use ex-ante measurement of uncertainty, i.e. firm's expectation of the future values of variables that influences the investment decision than to use ex-post one, it is very costly and time consuming to obtain adequately reliable information which then is used to construct the ex-ante measurement of uncertainty.

Although there are comparatively fewer studies for developing countries, findings from these studies are not much different from studies for developed economy. Using accelerator investment model augmented by cash flow, uncertainty proxy, Lensink and Sterken (2000) find that Czech firms on average react to uncertainty positively. Bo and Zhang (2002) finds that labor cost uncertainty has a positive effect on investment of collective firms in machinery industry in Liaoning province, but it does not affect investment of state-owned enterprises. Le et al. (2004) find that uncertainty reduces investment of rice millers in the Mekong River Delta (Vietnam) in the presence of irreversibility. But the negative relationship between uncertainty and investment is not affected by the degree of irreversibility. Pattillo (1998) finds that Ghanian manufacturing firms wait to invest until the marginal revenue product of capital reaches a firm-specific hurdle level. Moreover, higher uncertainty raises the hurdle level that triggers investment, and uncertainty has a negative effect on investment levels that is greater for firms with more irreversible investment. Darku (2000) also find that there is a negative relationship between uncertainty and investment

among Ugandan firms and the effect is larger for firms with less reversible investment. Recently, Leefmans (2011) find that uncertainty has a significant negative effect on investment for Tanzanian medium and large firms, but not for micro and small firms. Meanwhile, for firms that have possibility to reverse their investment decision, the effect of uncertainty on investment becomes less negative.

III. Empirical approach

III. Estimation equation

We estimate the following investment equation by using by using the random-effect tobit estimation since the proportion of firms with zero investment rate are rather high.

$$inrate_{it} = \theta_0 + \theta_1 IU_{it} + \theta_2 SU_t + \theta_3 X_{it}^i + \zeta_{it}$$

To test the heterogeneous effects of uncertainty, we estimate the following equation:

$$inrate_{it} = \theta_0 + \theta_{11} Corp_{it} IU_{it} + \theta_{12}(1 - Corp_{it}) IU_{it} +$$

$$+\theta_{21} Corp_{it} SU_t + \theta_{22}(1 - Corp_{it}) SU_t + \theta_3 X_{it}^i + \zeta_{it}$$

of which $inrate_{it}$ is the investment rate of firm *i* at time *t*, IU_{it} is the idiosyncratic uncertainty; SU_t is the macroeconomic uncertainty; X_{it} is the firm characteristics; and ζ_{it} is the error terms. X_{it} includes firm labor (as proxy for firm size) and its square (to capture the non-linear relationship between firm size and investment); capital-labor ratio (as proxy for capital intensity); whether firm sells parts of its asset (as a proxy for reversibility of investment); whether firm fully utilized their capacity; whether firms is credit constrained; percentage of sales as final consumption goods; previous borrowing relationship with banks; whether firms received the government assistance; firm age; firm's sales revenue; and whether firm is an urban firm. $Corp_{it}$ is a dummy variable, which takes value of one if a firm is a corporate firm and zero otherwise. We also control for firm's industry and location.

We test the effect of uncertainty on firm's exit decision by estimating the following equations using heteroskedastic probit method:

$$\Pr(exit_{it}=1)=\Phi(\delta_0+\delta_1 IU_{it}+\delta_2 SU_t+\delta_3 X_{it}^e+\psi_{it})$$

$$\Pr(exit_{it}=1)=\Phi(\delta_0+\delta_{11}Corp_{it}IU_{it}+\delta_{12}(1-Corp_{it})IU_{it}+$$

$$+\delta_{21}Corp_{it}SU_t+\delta_{22}(1-Corp_{it})SU_t+\delta_3 X_{it}^e+\psi_{it})$$

III.2. Variable construction

III.2.1. Investment rate and exit decision (outcome variables)

We calculate two measures of investment rates: (i) production investment rate and (ii) non-production investment rate. The first investment rate is calculated as the ratio of investment for production (including investment on building, equipment and machinery, research and development and training) in this period to the total physical asset at the end of the last period. For the second investment rate, we use the ratio of land investment, investment on other firms and other unspecified investments to the total physical asset. Using these two investment rates will allow to see how firm's investment strategy is affected by the uncertainty.

For exit decision analysis, we use two definitions of exit firms. First one includes those who are not be able to contact or decline to participate in the survey in the next period. By the second definition, exit firms are those firms that did not participate in the next round of survey and were confirmed to exit the market. In other words, in the first definition, exit firms are all attributed firms while the second one is only the firm that affirmably exited.

III.2.2. Measurement of uncertainty

In this paper, the idiosyncratic uncertainty is measured by the 3-year rolling standard deviation of gross profit rate. We use yearly accounting data from 2004 to 2011 to calculate

the yearly (gross) profit rate, which is the ratio of gross profit (i.e. sales revenues minus raw material costs, wages and bonus, and other indirect cost reported) and sales revenues (i.e. gross profit rate = (sales revenue - raw materials - wages and other wages - other input costs)/sales revenue).

For robustness check, we calculate another measure of idiosyncratic uncertainty is calculated as follows. First, we estimate a profit rate equation as follows:

$$pi_{it} = \alpha + \beta_1 pi_{t-1} + \beta_2 X_{it} + \mu_i + \epsilon_{it}$$

of which pi_{it} is the profit rate, X_{it} is firm characteristics including firm's industry, labor, age, μ_i is firm fixed effect and ϵ_{it} is the error terms. The error terms measure unobserved factors that determine the profit rate, and could be considered as the profit shock factor. We then calculate the 3-year rolling standard deviation of ϵ_{it} as a measure for profit uncertainty. For example, the profit uncertainty measure for firm in 2011 will be the standard deviation of error terms obtained from the above equation for that firm in 2011, 2010 and 2009. Due to the model specification, we cannot have error terms for 2004, thus for 2006, we use the standard deviations of error terms in 2005 and 2006. We cannot calculate the profit uncertainty in 2004 and 2005.

III.2.3. Other study variables:

- *Full capacity utilization* is a dummy variable, which takes value of one if firm stated that it utilized 100% capacity of their equipment and takes value of zero otherwise. Firms that fully utilize their capacity will more likely to invest more than those firms do not. It also reflects that the demand for their product is high so they may get more profitable if it expands their capacity.
- *Cost of finance* measures the price of capital. We use the ratio of total interest payment a

firm has to pay in a given year to its total liability in that year as the proxy for the cost of capital. If a given firm does not engage in any borrowing activity, the cost of finance that firm faces will be the mean of the cost of capital of the same type of firms in the same district where the firm locates. Our calculation of capital cost average out all interest rates that they have to pay in a given period or they may expect to pay if they borrow.

- *Demand as a major growth constraint* is a binary variable, which takes value of one if firm considered demand as one of three major growth constraints. It is expected that firm reported that the lack of demand as one of their three major growth constraints will not invest in production, but potentially increase in non-production as a firm's growth measure.
- *Selling assets during the period* is a dummy variable, which takes value of one if firms sell its assets and of zero otherwise. This variable is used as a proxy for partial reversibility of investment and potentially endogenous. To deal with the endogeneity, we directly deduct the total amount of asset sold in the period to the total production capital to get net production investment. We calculate the net production investment rate as the ratio of this net production investment to total asset.
- *Receiving government assistance* is a dummy variable which takes value of one if a firm receives at least one of six government assistance including investment incentive (tax exemptions or reduction); policy lending /soft loans from Vietnam Development Bank or Vietnam Bank for Social Policy; human resource training program; national key trade promotion program; quality and technology improvement program; and other government programs and equals to zero otherwise. This variable is also subject to endogeneity problem.
- *Previous borrowing relation with banks* is a dummy variable. If a firm is able to borrow from formal financial institutions previously, the variable takes value of one and zero

otherwise. Having previous banking relation will reduce the agency costs of the banks and banks are likely to extent their credits or lend at lower rate.

- *Contact in the banking sector* is the log of the reported number of contacts in banking sector. Having more contact in the banking/financial sector will ease the credit access of firms.
- *Contact in the political systems* is the log of the reported number of contacts in authority agencies. Similar to contact in the banking sector, having more contacts in the political system is expected to facilitate firms' access not only to the credit but also other public service. So it is expected to have positive effect on firms' investment rate.
- *Credit constraint* is a dummy variable. It takes values of zero if firms that can borrow from banks and firms stated that they do need to borrow from banks (and other formal financial institutions) and take value of one otherwise. This means that credit constrained firms are those who stated that they were not be able to borrow from banks due to the tough borrowing conditions or not having adequate collateral to borrow from banks. However, this variable is potentially endogenous (Reyes and Linksen, 2012). Some firms choose not to borrow from banks although they meet all requirements to borrow. To deal with the endogeneity, we instead use the variable indicating that firm could not access to formal credit source because they lack collateral.
- For the exit decision regressions, we also control for the number of regular customers, firms as the major source of income, home as major production site.
- In all specification, we control for province, and industry dummies.

In our specification, cost of finance, lagged revenues, previous borrowing relations with banks, (number of) contacts in banking system and in political system and sales are variables indicating imperfect capial market. Moreover, to ensure the exogeneity of independent variables, all variables, except the credit constraint and asset sold, are first lagged variables.

IV. Data and descriptive statistics

The data is jointly collected by University of Copenhagen, CIEM and ILSSA in 2005, 2007, 2009 and 2011. The surveys were conducted in 10 provinces, 4 in the North, 3 in the Central and 3 in the South. Due to implementation issue, only some specific areas in each province and city are selected. In each province, both urban districts and rural districts are chosen. In each province, the sample was stratified by ownership form to ensure that all types of non-state enterprises, including formal and informal firms were represented. Subsequently, stratified random samples were drawn from a consolidated list of formal enterprises and an on- site random selection of informal firms.

After each survey round, to replace exit firms or a small number of firms, which declined to continue the survey, some firms would be randomly selected on the list of formal firms combined by the GSO in the previous years (For example, for 2007 survey, replaced firms are selected from Enterprise census in 2006) and on-site selection of informal firms (see Demenet et al., 2010 and Rand and Torm, 2012). The sample size for each survey is 2,821 firms for 2005 survey, 2,635 firms for 2007 survey, 2,655 firms for 2009 survey and 2,552 firms for 2011 survey.

Although the sample is slightly adjusted overtime, the questionnaires are nearly the same. Information collected include firm's general characteristics; firm history; household characteristics of the owner/manager; production characteristics; sales structure and export; indirect costs, raw materials and services; investments, assets, liabilities and credit; fees, taxes and informal payments; employment; environment; network and economic constraints and potentials.

Due to our approach in measuring the uncertainty, the sample for estimating the effect of uncertainty on investment are those that participate in the survey at least three consecutive

times, either in 2005, 2007 and 2009 or 2007, 2009 and 2011. Moreover, our approach in measuring the uncertainty and empirical approach (i.e. we use lagged uncertainty to avoid the endogeneity and causal reversibility problem) permit us to estimate the uncertainty effect on investment during two periods, 2007-2009 and 2009-2011. After dropping firms without adequate information, we have an unbalanced sample of 3,332 firms.

However, for estimating the exit decision, our empirical approach and uncertainty measuring approach allow us to estimate the exit decision of firms participated in 2005, 2007, 2009 surveys. The sample size for the exit decision estimation is 4,133 firms if we define exit firms as those firms that confirm their existence and those firms whom self-select not to participate in the survey. The sample size reduces to 3,910 if we only consider the exit firms are those who are confirmed to exit from market.

[TABLE 1 ABOUT HERE]

Table 1 presents some basic statistics of firms in our sample. Proportion of firms invested in each period is rather low. Only 33.5% of firms have production investment activity during 2005-2007. This figure, however, declines to 31.3% in the period 2007-2009 and further to 25.7% in 2009-2011. Of all sole proprietorship firms, only 30.8%, 28.7% and 22.3% of firms invested in 2005-2007, 2007-2009 and 2009-2011 respectively. The figures for corporate firms are higher with 41.8%, 38.5% and 34.4% firms having production investment activity. While there is a general declining trend in the number of firms having production investment, the percentage firms having non-production investment increases from 8.8% in 2005-2007 to 36.0% in 2009-2011. We see the similar pattern for two subsamples of sole proprietorship and corporate firms. The percentage sole proprietorship firms having non-production investment increases from 6.0% in 2005-2007 to 32.9% in 2009-2011. The figure for corporate firms is from 17.5% in 2005-2007 to 43.8% in 2009-2011. Relating to the

investment rate, we see a decline trend in production investment rate and increasing trend in non-production investment rate. The production investment rate fall from 22.5% in 2005-2007 to only 15.1% in 2009-2011 while the non-production investment rate increases from 8.4% in 2005-2007 to 24.4% in 2009-2011. The data also shows that the corporate firms have much larger fall in investment rate.

[TABLE 2 ABOUT HERE]

Table 2 provides some basic statistics about firms in our sample. We see that the mean revenue of firms that have investment activity is much higher for firms with investment activity. With regards to other variables such as average labor per firm, capital, proportion of firms without credit constraints, proportion of firms with previous borrowing relationship with banks, proportion of firms with government assistant, proportion of firms that sold its assets and proportion of firms receiving government assistance in the period, those firms with investment activity seems to have higher figure than that of firms without investment activity. We also see that firms with more contacts in banking and political systems more likely to invest. However, investment firms are less likely to report that their capacity is fully utilized. The proportion of firms reported that demand as the major constrain for their firm growth is higher among non-invested firms. We, however, do not see the large difference between firms with investment and firms without investment in terms of capital intensity and proportion of products used as final goods. Meanwhile, older firms are also more reluctant to invest than their younger counterparts. Firms that locate in rural areas are more likely to invest than the urban firms. However, the difference between urban firms and rural firms are not so large.

[TABLE 3 ABOUT HERE]

Table 3 presents our calculation of uncertainty. We see a large increase in the

macroeconomic uncertainty from 2007 to 2009, to 0.2719 during the period 2007-2009 from 0.1086 in 2005-2007. The macroeconomic uncertainty reduced slightly to 0.1882 during 2009-2011, partly due to the Vietnam's Government measures to curb the inflation hike during the previous period (Vo and Nguyen, 2012). However, during the same period, unadjusted firm-level uncertainty slightly reduces from 0.08 in 2007 to 0.06 in 20011.

V. Econometric results

V.1. Investment under uncertainty and imperfect capital market

Table 4 presents the relationship between idiosyncratic uncertainty and investment. The dependent variable in columns [1] and [3] is the production investment rate and in columns [2] and [4] is the non-production investment rate. In columns [2] and [3], we include the interaction terms between industry dummies and year dummies and between province dummies and year dummies to control for the unobserved changes in the industry that the firms operate in (for example, different growth rate of different industry in each period) and the location where the firms locate (for example, the provincial authority may change their policies/procedure to facilitate the firms' operation, especially private firms'). The results in column [1] indicate a negative relation between production investment rate and idiosyncratic uncertainty. As we include the interaction terms into our estimation (column [3]), the coefficient on idiosyncratic uncertainty slightly reduces from -0.182 to -0.197. This implies the correlation between these two variables becomes stronger as unobserved changes in industrial and provincial characteristics are controlled. However, the empirical evidence does not find a statistically significant correlation between idiosyncratic uncertainty and non-production investment rate, although the relationship is negative.

[TABLE 4 ABOUT HERE]

Table 5 shows how firms' investment rates respond to both idiosyncratic and

macroeconomic uncertainties. We present the results for production investment rate in columns [1], [2] and [3], and for non-production investment rate in the remaining columns. In columns [1] and [4], we add the macroeconomic uncertainty into the estimation specifications presented in columns [1] and [2] of Table 4. The results in column [1] indicate the negative correlations between production investment and macroeconomic uncertainty. However, as we include our two sets of interaction terms into our estimation, this relationship becomes positive, but statistically insignificant. This may be because the industry and province may have some adjustments in response to the macroeconomic uncertainty. More specifically, in our specifications, macroeconomic uncertainty is the first lag, so if macroeconomic uncertainty in the previous period increases, the provincial authority may have some policy responses or the whole industry may have some adjustments in this period. Such adjustments are unobserved in our data, so the empirical results from estimation without interaction terms reflecting such adjustment as in columns [1] may cause the biases in estimation due to omitted variable.

[TABLE 5 ABOUT HERE]

With regards to the relationship between idiosyncratic uncertainty and production investment rate, the evidence still shows a negative correlation. Moreover, the coefficients in columns [1] and [2] of Table 5 are equal to the ones obtained without macroeconomic uncertainty (columns [1] and [3] of Table 4). This suggests a robust relationship between idiosyncratic uncertainty and production investment rate.

Similar patterns are also seen for the relationship between non-production investment rate and idiosyncratic uncertainty. As presented in columns [4] and [5] of Table 5, there is no evidence of such relationship when we add the macroeconomic uncertainty into our estimations presented in columns [2] and [4] of Table 4. Moreover, the coefficients on

idiosyncratic uncertainty do not change. However, the results presented in column [4] indicate that macroeconomic uncertainty negatively correlates with non-production investment rate. This relationship is even stronger when the interaction terms are added into our estimations (columns [5]).

The results in Table 5 also show that coefficients on other variables for each corresponding estimation equations are similar to the ones we presented in Table 4. We see that firm size (measured by the labor size) differently correlates with different types of investment. While it has a positive and non-linear correlation with production investment rate, larger firms tend to investment less on the non-production investment. This implies that sole proprietorship firms, which usually are much smaller in size than corporate firms, are more likely to extend their investment outside their core businesses, even after we have controlled for uncertainty and other factors. The results also indicate that firms with higher capital intensity tend to have lower investment rate (contradict with literature???). However, the relation between capital intensity and non-production investment rate tend have stronger than that the relationship between capital intensity and production investment rate. This may imply that firms that have invested more in production previously (i.e. higher lagged capital intensity) tends to focus more on their own production rather than finding opportunities in non-production investment.

Table 4 and 5 also show that firms that fully utilize their capability are likely to have higher production investment rate. But full capability utilization does not correlate with non-production investment rate. The results also show that firms with higher share of final goods in total sales also invest more. This may due to fact the firms that produce final goods are facing fiercer competition, especially with imported goods, so investment is necessary to improve their competition.

While firms that lack collateral to borrow from formal credit sources have lower investment rate, the previous borrowing relationship with banks, which suggests lower costs of borrowing for firms, thus easier to get loans in current period, does not have a significant effect on production investment rate but on non-production investment rate. This may imply that firms with easier access to formal credit tend to expand their investment in non-production instead of using this advantage to increase the investment in production. Similarly, firms with more contacts in the banking system tend to invest more, both in production and non-production, but the magnitude of coefficient from non-production investment rate equation is slightly larger than that from production investment rate equation. However, we do not find any evidence that cost of capital has a statistically significant effect on investment rate and that having more contacts in political system increases the investment rate. The results also show that firm's age have a negative and statistically significant effect on firms' production investment rate. But it does not have a statistically significant effect on non-production investment rate.

V.2 Credit constrains, government assistant, reversibility of investment and investment rate

In columns [3] and [6] of Table 5, we include our suspected endogenous variables (dummy variables for firm's credit constraint condition, firm's receiving government assistance and firm's asset selling during the period) into our estimations. These variables are endogenous because there may exist some owners' unobserved characteristics that could affect both either firms' ability to access government assistance or firms' decision not to borrow from formal financial institutions and firms' investment decision, for example.

The results show that the coefficients on idiosyncratic uncertainty do not considerably change, while the coefficients on macroeconomic uncertainty significantly change, especially for non-production investment rate (from -6.29 to -5.62). This implies a highly correlation

between macroeconomic uncertainty and the suspected endogenous variables. The results also show that the investment rate are higher for those firms without credit constraint, or firms receiving government assistance or selling parts of their assets. Furthermore, we find a stronger (pairwise) correlation between these variables and non-production investment rate. This suggests that firms' may divert their investment to non-production investment if they are not credit constraint or are able to receive government assistance. As mentioned above, variable that indicates whether a firm sells their assets in the period could suggest the reversibility of investment. The evidence shows a positive correlation between reversibility and production investment rate and no correlation between this variable and non-production investment rate. The interaction terms between whether firms sell its asset and macroeconomic uncertainty reflects whether selling assets could mitigate the influence of macroeconomic uncertainty on firms' investment or not. However, the result shows there is not such statistically significant correlation.[1]

V.3. Heterogeneous response to uncertainty

Panel B of Table 4 and 5, we show the relationship between uncertainty and investment for different types of firm ownership. As presented in Table 4, there is a negative correlation between production investment rate and idiosyncratic uncertainty for corporate firms. The relationship seems to be stronger when we add two sets of interaction terms into our estimation. Among the sole proprietorship firms, the relationship is also negative, but this relationship is statistically insignificant.

The heterogeneous responses of firms to idiosyncratic uncertainty are also found as we add the macroeconomic uncertainty into our estimation. Corporate firms are still negatively

[1] In appendix A1, we estimate the net production investment rate, which is equal to the ratio of production investment minus the value of asset sold to the total physical asset in the previous period. The idiosyncratic uncertainty coefficient is larger than the one we obtain from estimating the production investment rate. This suggests irreversibility of investment does not reduce the negative effects of idiosyncratic uncertainty on production investment.

correlated with idiosyncratic uncertainty while among sole proprietorship firms, the idiosyncratic uncertainty negatively correlated with production investment rate. This relationship is statistically insignificant, however. We also find that corporate firms' and sole proprietorship firms' production investment rates respond differently to the macroeconomic uncertainty, although such correlations are not statistically significant. With regard to non-production investment rate, the evidence does not show different responses of sole proprietorship firms and corporate firms to macroeconomic uncertainty. But the responses to idiosyncratic uncertainty are rather heterogeneous. While idiosyncratic uncertainty positively correlated with non-production investment rate of corporate firms, it has a negative relationship among sole proprietorship firms. These correlations, however, is statistically insignificant.

V.4. Causality of uncertainty and investment rates

The idiosyncratic uncertainty coefficient presented in column [2] and [4] of Table 4 could be interpreted as the impact of idiosyncratic uncertainty on production and non-production investment rates, respectively. It is partly due to the fact that we use the lagged idiosyncratic uncertainty in our estimation, and the lagged uncertainty may not correlate with the unobserved variables in our estimation. It may be argued that the macroeconomic uncertainty could lead to the unobserved changes in industrial and provincial characteristics. However, as we include the macroeconomic uncertainty into our estimation (columns [2] and [5] of Table 5), the coefficient does not change, both in terms of magnitude and the level of significance. Furthermore, as we add the suspected endogenous variables into our estimations as in columns [3] and [6] of Table 5, the coefficients slightly change (from -0.197 to -0.204 for production investment equation and from -0.009 to -0.004 for non-production investment equation). We also find the similar patterns when we use other definition of idiosyncratic uncertainty (see Appendix A2).

Similarly, we can interpret the coefficients on firm size, asset intensity, sales, the number of contacts in the banking system, percentage of sales as final consumption goods and variables indicating firms' capacity utilization and firms' lack of collateral for borrowing as the impact of such variables on investment rate. In fact, when we exclude all suspected endogenous variables and our two measure of uncertainty, i.e. idiosyncratic uncertainty and macroeconomic uncertainty, the coefficients on such variables change slightly (see Appendix A3 for the results).

We, however, could only interpret the coefficients on macroeconomic uncertainty as the correlation between this variables and investment rates. Since this variable may be correlated other unobservable variables. For example, in columns [3] and [5] of Table 5, the coefficients on macroeconomic uncertainty change, although they remain statistically insignificant. This is possibly because the government may have some policies to curb with macroeconomic uncertainty. Inclusion of such variables may mitigate the endogeneity problem, but such variables are themselves potentially endogenous (for example, some unobserved characteristics of owners/managers may correlate with firms' possibility to get government assistance or firms' willingness to borrow from banks).

V.5. On the relationship between uncertainty and investment portfolio

As presented in the above sections, firms' production and non-production investment rate are related to the both uncertainty, although such relations are different for each type of investment. This implies that firms may select their investment portfolio under the different types (and level) of uncertainty. Table 6 presents our estimation for investment portfolio under imperfect capital market and uncertainty. The dependent variable is the ratio of production investment to total investment. Columns [1] and [3] are the results without macroeconomic uncertainty and other suspected endogenous variables. We adopt the

Semykina and Wooldridge (2010)'s approach to deal the sample selection problem for panel data arising due to inclusion of only those firms, which have either production investment or non-production investment. The results with sample selection are presented in columns [3] and [4].

[TABLE 6 ABOUT HERE]

The results show that share of production investment may negatively correlate with idiosyncratic uncertainty, but this relationship is statistically insignificant. However, macroeconomic uncertainty has a positive relationship with the share of production investment. This may reflect the fact that the non-production investment rate is strongly and negatively correlated with macroeconomic uncertainty. Inclusion of sample correction bias, however, does not change coefficients on almost variables. The results also suggest that firms, which consider lack of demand as their most important growth constrains, may divert their investment to non-production investment. Similarly, firms with higher sales are also likely to shift a part of their investment into non-production. Meanwhile, corporate firms and firms locating in urban areas seem to invest more in production than sole proprietorship firms and firms locating in rural areas.

V.6. Effects of uncertainty on firm's exit decision

Table 7 presents some basic statistics for exit and survival firms in our sample. As mentioned above, we have two definitions for exit; one including attrition firms and confirmed exit firm (773 firms), and the other including only confirmed firms (441). The number of survival firms in our sample is 3,340. That mean the exit rate is about 18.9%. However, the confirmed exit account for 10.7%. We see that in general there is not so significant difference between firms in different exit groups, except for total number of

employees. With the first definition of exit, the average number of employees is 23.2 while that figure in the confirmed exit firm group is only 10.2. In general, exit firms have lower regular buyers, experience slightly lower idiosyncratic uncertainty than survival firms. The proportion of firms considered that earnings from the firms as the major income source is lower among exit firms than among the survival firms. Similarly, the proportion of firms, which use home as their major production site, is also lower than those of whom survive. Proportion of firms that receive government assistance is also lower among exit firms than among survival firms. Table 8 also shows that firms located in urban areas seem to be more like to exit than firms in rural areas.

[TABLE 7 ABOUT HERE]

Table 8 presents the effects of uncertainty on firm's exit decision. Columns [1] and [2] are results estimated by using the first definition of exit and columns [3] and [4] are for using the second definition of exit. We see that macroeconomic uncertainty have positive effect on firm's exit decision while idiosyncratic uncertainty has no statistically significant effects on exit. The uncertainty level increases by 100%, the probability of exit increase from 25.5% to 32.5%, depending on the definition of exit we used. Columns [2] and [4] are used to see the heterogeneous effects of uncertainties on firm's exit. We see that macroeconomic uncertainty have stronger effects on corporate firms' exit decision, regardless of the exit definition we used. However, if we used the second definition of exit, the effect of macroeconomic uncertainty on firm's exit decision is not so much different from sole proprietorship firms and corporate firms. Moreover, the idiosyncratic uncertainty does not have influenced both types of firms' exit decisions.

[TABLE 8 ABOUT HERE]

The results also show that firm size has a negative relation with exit decisions. That

means, the bigger is a firm, the lower is its probability of exit. However, with the first definition of exit, the relationship between firm size and probability of exit is not linear as that when we use the second definition (we have tested by dropping the labor squared variables, and find a negative and statistically significant effect of number of labor on probability of exit). Firm's that have more regular buyers also have lower probability of exit. Similarly, a firm that received government assistance also has a larger survival probability. Looking at the location, we see that firms located in urban area have higher probability of exit. This may due to the fiercer competition in urban areas. We also find that a firm has a lower probability of exit if the income from operating the business is the major income sources for the owners' family and if the firms use their home as major production site.

VI. Conclusion

This paper examines the relationship between uncertainty and firms' decision investment and exit decisions in Vietnam. We use 36-month rolling standard deviation of consumer price index as proxy for macroeconomic uncertainty. The idiosyncratic uncertainty is measured by the firm-level profit uncertainty. The outcome variables we use in this paper are investment rates: production investment rate and non-production investment rate. We also use two definitions of exit firms: one including those firms who confirm their exit from the market, and one includes those who either confirm their exit from the market and who withdraw themselves from the survey.

The empirical evidence shows that only idiosyncratic uncertainty has negative and statistically significant impacts on production investment rate. However, all types of uncertainty have no statistically significant effects on non-production investment. As we allows the industrial and provincial characteristics to vary over time, the idiosyncratic and industry-wide uncertainties still have the similar effects on both types of investment but

macroeconomic uncertainty loses its significant effects on production investment and has negative and statistically significant effect on non-production investment. The findings also show that there are heterogeneous effects of uncertainty on sole proprietorship firms and corporate firms. We find that the idiosyncratic and macroeconomic uncertainties have strong negative correlation with corporate firms' production investment. But only macroeconomic uncertainty has statistically significant correlation with sole proprietorship firms' investment and the magnitude effect is much lower than that of corporate firms.

The empirical evidence also shows that other variables indicating imperfect capital market such as cash flow, number of contacts in banking system, previous relationship with banks and lack of collaterals also have statistically significant effects on firms' investment. We also find a positive correlation between receiving government assistance and investment. The reversibility of investment may have small positive correlation with investment rate, but this relation is not robust.

Relating to the role of uncertainty in firm's exit decision, the results suggest that while macroeconomic uncertainty has strong negative effects on firm's exit decision, regardless of the definition of exit we adopt, while the idiosyncratic uncertainty have no statistically significant effects on firm's exit decision. Other factors such as number of employees, number of regular buyers, firms as major sources of income, home as major production site, receiving government assistance and firms age also have statistically significant effects on firms' exit decision.

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Figure 1: Year-on-year monthly inflation rate

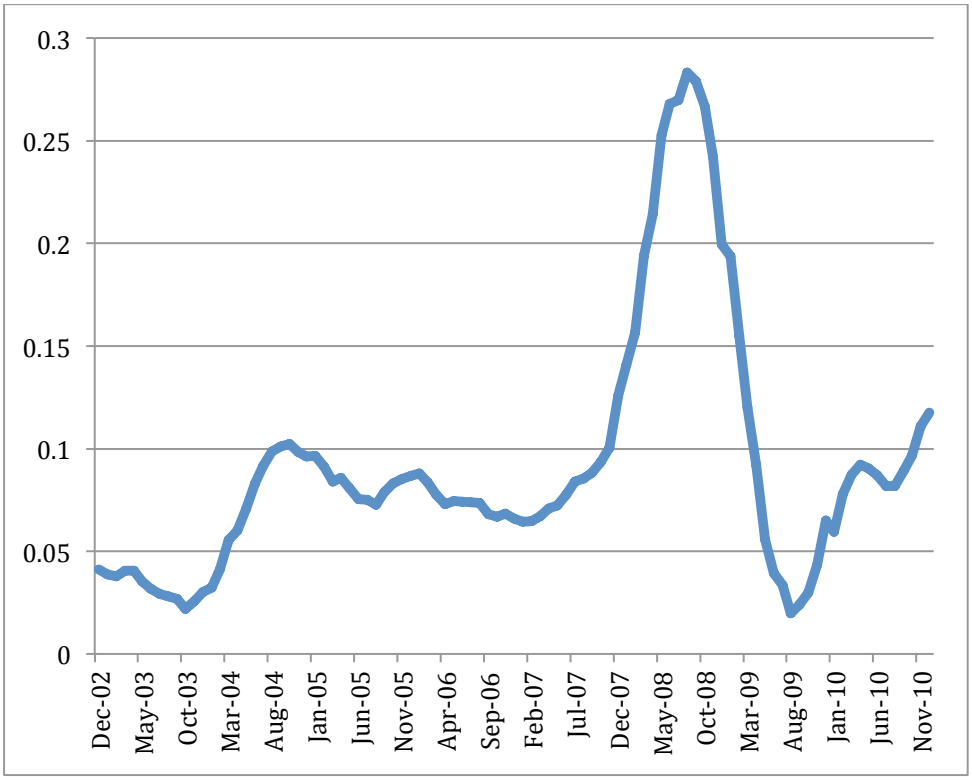
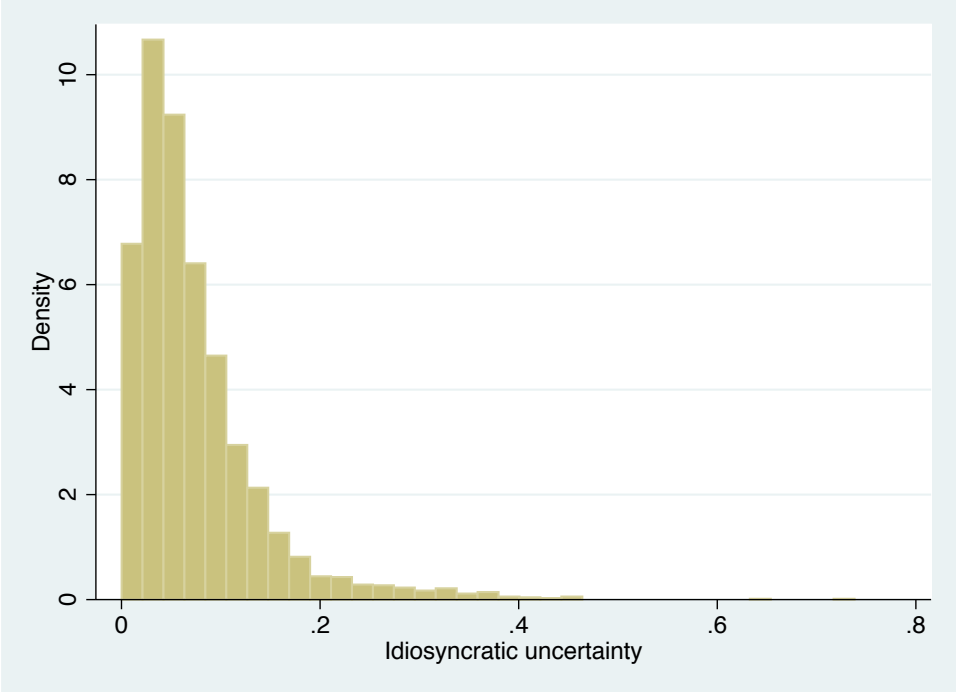
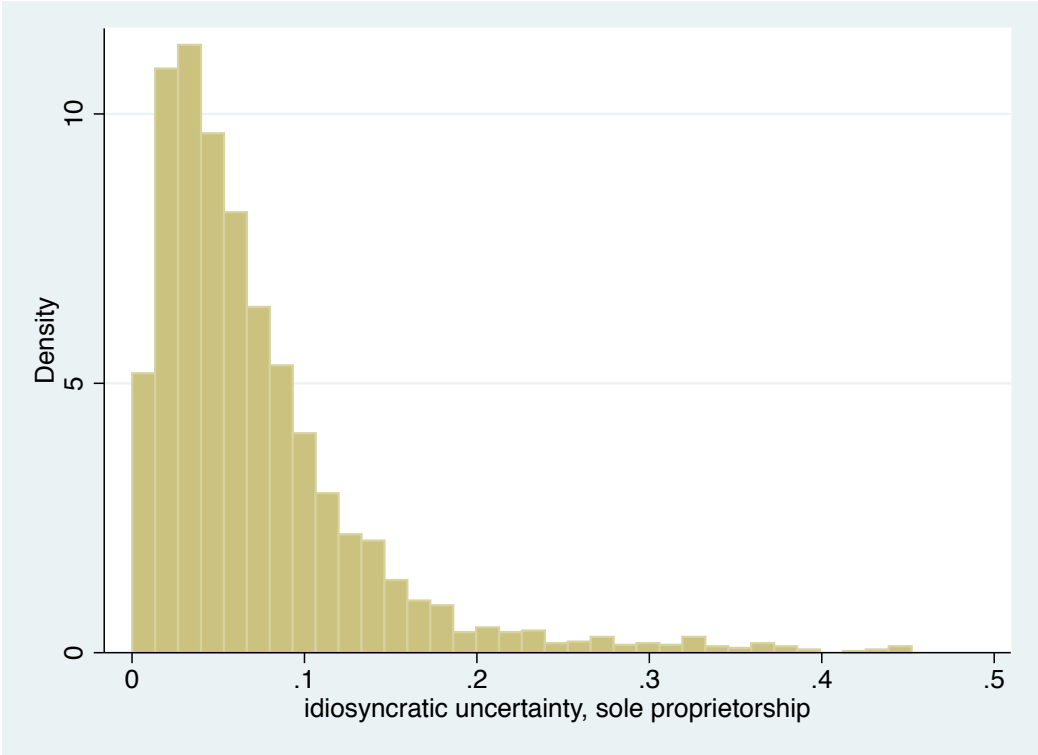


Figure 2: The idiosyncratic uncertainty distribution




Density
0
5
10
0
.1
.2
.3
.4
.5
idiosyncratic uncertainty, sole proprietorship

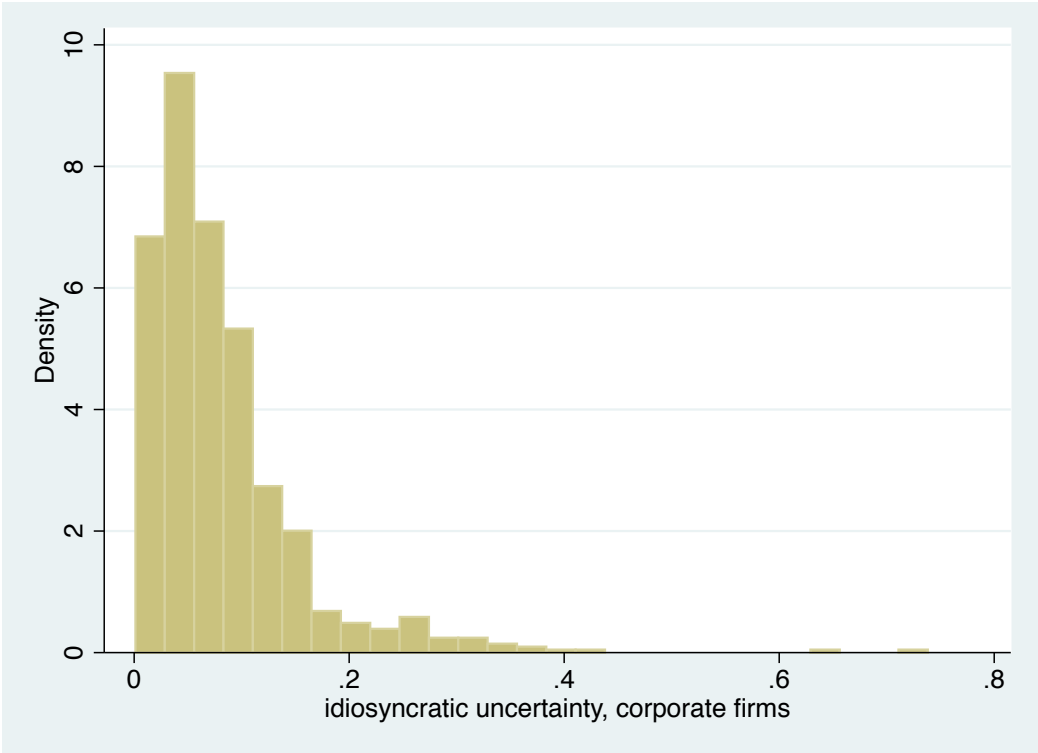

Density
0
2
4
6
8
10
0
.2
.4
.6
.8
idiosyncratic uncertainty, corporate firms

Table 1: Descriptive statistics (investment and uncertainty)

Year	All	Sole proprietorship	Corporate firm
% firms had production investment			
2007	33.5%	30.8%	41.8%
2009	31.3%	28.7%	38.5%
2011	25.7%	22.3%	34.4%
% firms had non-production investment			
2007	8.8%	6.0%	17.5%
2009	33.6%	32.1%	37.8%
2011	36.0%	32.9%	43.8%
Production investment rate			
2007	22.5%	13.5%	52.4%
	[1.320]	[0.750]	[2.360]
2009	12.9%	8.1%	28.3%
	[0.595]	[0.350]	[1.035]
2011	15.1%	8.6%	33.2%
	[1.476]	[0.483]	[2.752]
Non-production investment rate			
2007	8.4%	6.1%	16.0%
	[0.922]	[0.949]	[0.821]
2009	27.8%	22.2%	45.5%
	[1.502]	[1.500]	[1.495]
2011	24.4%	16.6%	46.2%
	[1.209]	[0.700]	[2.029]

Table 2: Some descriptive statistics

		All firms	Invested firms	Non invested firms
Revenue (real)	Mean	2,042.70	3,043	690
	SD	[45,400]	[59,700]	[4,152]
Labor	Mean	13.2	16.9	8.0
	SD	[27.08]	[32.7]	[15.4]
Capital	Mean	435.267	588.5	228.2
	SD	[1,915]	[2,415]	[819.7]
Capital intensity	Mean	27.480	27.6	27.4
	SD	[73]	[65.5]	[82.5]
Final good	Mean	0.350	0.351	0.349
	SD	[0.38]	[0.39]	[0.38]
Full utilization of capacity	Mean	0.096	0.074	0.126
	SD	[0.30]	[0.26]	[0.33]
Demand as a constraint	Mean	0.186	0.156	0.227
	SD	[0.39]	[0.36]	[0.42]
Firm age	Mean	17.117	16.258	18.279
	SD	[9.76]	[8.79]	[10.84]
Contact in banking system	Mean	1.219	1.741	0.513
	SD	[2.90]	[3.41]	[1.79]
Contact in political system	Mean	1.593	1.843	1.255
	SD	[3.56]	[4.21]	[2.40]
Lack of collateral for borrowing from banks	Mean	0.023	0.024	0.021
	SD	[0.15]	[0.15]	[0.14]
Credit constraint	Mean	0.280	0.241	0.334
	SD	[0.45]	[0.43]	[0.47]
Previous borrowing relationship	Mean	0.377	0.476	0.243
	SD	[0.48]	[0.50]	[0.43]
Government assistant	Mean	0.238	0.303	0.151
	SD	[0.42]	[0.46]	[0.36]
Asset sold	Mean	0.038	0.059	0.009
	SD	[0.19]	[0.24]	[0.10]
Urban	Mean	0.489	0.463	0.523
	SD	[0.50]	[0.50]	[0.50]

Table 3: Idiosyncratic uncertainty, by ownership type

		All firms	Sole proprietorship	Corporate firm
2007	Mean	0.094	0.089	0.112
	Median	0.070	0.067	0.081
	St. dev.	0.080	0.074	0.097
2009	Mean	0.080	0.076	0.093
	Median	0.062	0.058	0.075
	St. dev.	0.066	0.064	0.070
2011	Mean	0.067	0.066	0.071
	Median	0.050	0.049	0.051
	St. dev.	0.064	0.062	0.068

Table 4: Impact of idiosyncratic uncertainty on investment

PANEL A:

	[1]	[2]	[3]	[4]
	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1
Lagged labor (log)	0.065***	0.022	0.070***	0.025
	[0.019]	[0.035]	[0.019]	[0.035]
Lagged labor squared (log)	-0.008**	-0.025***	-0.008**	-0.026***
	[0.003]	[0.007]	[0.003]	[0.007]
Lag asset/labor	-0.029***	-0.078***	-0.027***	-0.076***
	[0.005]	[0.018]	[0.005]	[0.018]
Lagged BPI	-0.041	0.105	-0.033	0.13
	[0.048]	[0.095]	[0.048]	[0.098]
Full utilization (lagged, dummy)	0.062***	0.036	0.055***	0.033
	[0.015]	[0.039]	[0.015]	[0.037]
Previous borrowing relations with banks (dummy)	0.014	0.093***	0.015	0.086***
	[0.015]	[0.032]	[0.015]	[0.033]
Demand as a major constraint (dummy)	-0.025	0.065	-0.019	0.063
	[0.017]	[0.041]	[0.017]	[0.040]
Lagged sales	0.016**	0.122***	0.013*	0.120***
	[0.007]	[0.033]	[0.007]	[0.032]
Idiosyncratic uncertainty (lagged)	-0.182**	-0.003	-0.197**	-0.009
	[0.078]	[0.156]	[0.078]	[0.158]
Contacts in banking sector (lagged, in log)	0.007**	0.012*	0.007**	0.014*
	[0.003]	[0.007]	[0.003]	[0.007]
Contacts in political system (lagged, in log)	0.001	0.001	0.001	-0.002
	[0.002]	[0.005]	[0.002]	[0.005]
% of sales as final consumptions goods (lagged)	0.029*	0.087**	0.031**	0.086**
	[0.015]	[0.040]	[0.015]	[0.041]
Lack of collateral for borrowing from banks	-0.044	-0.028	-0.023	-0.029
	[0.044]	[0.160]	[0.044]	[0.169]
Cost of finance (lagged)	-0.086**	-0.064	-0.083**	-0.061
	[0.038]	[0.062]	[0.038]	[0.061]

Owner/Manager have technical degree	0.003	0.006	0.003	0.004
	[0.014]	[0.033]	[0.015]	[0.033]
Owner/manager's gender	-0.007	-0.039	-0.008	-0.044*
	[0.012]	[0.026]	[0.012]	[0.026]
Firm's age	-0.042***	-0.035	-0.043***	-0.034
	[0.012]	[0.030]	[0.012]	[0.031]
Being a corporate firm	0.019	0.026	0.021	0.03
	[0.019]	[0.042]	[0.019]	[0.041]
Locating in urban area (dummy)	0.036**	-0.025	0.035**	-0.025
	[0.014]	[0.034]	[0.014]	[0.035]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy	No	No	Yes	Yes
Province dummy * year dummy	No	No	Yes	Yes
N	3332	3332	3332	3332

PANEL B: Heterogeneous effect

	[1]	[2]	[3]	[4]
	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1
Corporate firms * idiosyncratic uncertainty	-0.328**	0.381	-0.340***	0.39
	[0.129]	[0.292]	[0.128]	[0.290]
Sole proprietorship * idiosyncratic uncertainty	-0.103	-0.205	-0.118	-0.221
	[0.095]	[0.179]	[0.095]	[0.184]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy	No	No	Yes	Yes
Province dummy * year dummy	No	No	Yes	Yes
N	3332	3332	3332	3332

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Random effect tobit estimation is used to estimate the above equations. The coefficients presented in this table are the marginal effects of given variables on investment rate given that the lower censoring limit is set at 0%. The dependent variable in columns [1] and [3] is the production investment rate and in columns [2] and [4] is the non-production investment rate. In columns [3] and [4], we includes two sets of interaction terms, one between industry dummies and year dummies and one between province dummies and year dummies. Panel B presents the heterogeneity, caused by ownership type, in response to uncertainties. We include industry dummies and province dummies in all specifications.

Table 5: Investment under idiosyncratic and macroeconomic uncertainty (marginal effects, predicted for lower bound of investment rate of 0.0%)

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable	Ratio of production investment at t to physical asset at t-1			Ratio of non-production investment at t to physical asset at t-1		
Lagged labor (log)	0.065***	0.070***	0.073***	0.022	0.025	0.041
	[0.019]	[0.019]	[0.019]	[0.035]	[0.035]	[0.034]
Lagged labor squared (log)	-0.008**	-0.008**	-0.009***	-0.025***	-0.026***	-0.030***
	[0.003]	[0.003]	[0.003]	[0.007]	[0.007]	[0.008]
Lag asset/labor	-0.029***	-0.027***	-0.027***	-0.078***	-0.076***	-0.079***
	[0.005]	[0.005]	[0.005]	[0.018]	[0.018]	[0.018]
Lagged BPI	-0.041	-0.033	-0.043	0.105	0.13	0.125
	[0.048]	[0.048]	[0.048]	[0.095]	[0.098]	[0.099]
Full utilization (lagged, dummy)	0.062***	0.055***	0.056***	0.036	0.033	0.043
	[0.015]	[0.015]	[0.015]	[0.039]	[0.037]	[0.037]
Previous borrowing relations	0.014	0.015	0.014	0.093***	0.086***	0.062*
with banks (dummy)	[0.015]	[0.015]	[0.015]	[0.032]	[0.033]	[0.032]
Demand as a major constraint (dummy)	-0.025	-0.019	-0.019	0.065	0.063	0.066*
	[0.017]	[0.017]	[0.017]	[0.041]	[0.040]	[0.040]
Lagged sales	0.016**	0.013*	0.012*	0.122***	0.120***	0.117***
	[0.007]	[0.007]	[0.007]	[0.033]	[0.032]	[0.030]
Idiosyncratic uncertainty (lagged)	-0.182**	-0.197**	-0.204***	-0.003	-0.009	0.004
	[0.078]	[0.078]	[0.078]	[0.156]	[0.158]	[0.160]
Macro uncertainty (lagged)	-0.310***	0.127	0.21	-0.305*	-6.286***	-5.624***
	[0.068]	[0.910]	[0.908]	[0.183]	[1.824]	[1.714]
Contacts in banking sector	0.007**	0.007**	0.006**	0.012*	0.014*	0.012*
(lagged, in log)	[0.003]	[0.003]	[0.003]	[0.007]	[0.007]	[0.007]
Contacts in political system	0.001	0.001	0.002	0.001	-0.002	-0.001
(lagged, in log)	[0.002]	[0.002]	[0.002]	[0.005]	[0.005]	[0.005]
% of sales as final goods	0.029*	0.031**	0.032**	0.087**	0.086**	0.089**
(lagged)	[0.015]	[0.015]	[0.015]	[0.040]	[0.041]	[0.041]
Lack of collateral	-0.086**	-0.083**		-0.064	-0.061	
	[0.038]	[0.038]		[0.062]	[0.061]	
Credit constraints			-0.021*			-0.147***

			[0.012]			[0.037]
Receiving government assistance			0.041***			0.132***
			[0.013]			[0.039]
Selling assets			0.160**			0.627
			[0.066]			[0.588]
Selling assets * Macro uncertainty			-0.076			-2.194
			[0.297]			[2.155]
Cost of finance (lagged)	-0.044	-0.023	-0.023	-0.028	-0.029	0
	[0.044]	[0.044]	[0.044]	[0.160]	[0.169]	[0.168]
Owner/Manager with tech degree	0.003	0.003	0.004	0.006	0.004	0
	[0.014]	[0.015]	[0.014]	[0.033]	[0.033]	[0.034]
Owner/manager's gender	-0.007	-0.008	-0.007	-0.039	-0.044*	-0.037
	[0.012]	[0.012]	[0.012]	[0.026]	[0.026]	[0.026]
Firm's age	-0.042***	-0.043***	-0.040***	-0.035	-0.034	-0.034
	[0.012]	[0.012]	[0.012]	[0.030]	[0.031]	[0.031]
Being a corporate firm	0.019	0.021	0.026	0.026	0.03	0.034
	[0.019]	[0.019]	[0.019]	[0.042]	[0.041]	[0.040]
Locating in urban area (dummy)	0.036**	0.035**	0.036**	-0.025	-0.025	-0.029
	[0.014]	[0.014]	[0.014]	[0.034]	[0.035]	[0.037]
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy * year dummy		Yes	Yes		Yes	Yes
Province dummy * year dummy		Yes	Yes		Yes	Yes
N	3332	3332	3332	3332	3332	3332

Panel B: Heterogeneous response to uncertainty

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable	Ratio of production investment at t to physical asset at t-1			Ratio of non-production investment at t to physical asset at t-1		
Corporate firm * idio. uncertainty	-0.353***	-0.359***	-0.384***	0.399	0.387	0.366
	[0.129]	[0.129]	[0.128]	[0.297]	[0.294]	[0.295]
Sole proprietorship * idio. uncertainty	-0.094	-0.108	-0.106	-0.213	-0.219	-0.191
	[0.095]	[0.095]	[0.095]	[0.179]	[0.184]	[0.183]
Corporate firm * macro uncertainty	-0.628***	-0.181	-0.11	-0.083	-6.300***	-5.651***
	[0.132]	[0.912]	[0.910]	[0.298]	[1.837]	[1.735]
Sole proprietorship * macro uncertainty	-0.204***	0.205	0.29	-0.384*	-6.239***	-5.575***
	[0.077]	[0.905]	[0.903]	[0.216]	[1.849]	[1.738]

Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy * year dummy		Yes	Yes		Yes	Yes
Province dummy * year dummy		Yes	Yes		Yes	Yes
N	3332	3332	3332	3332	3332	3332

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Random effect tobit estimation is used to estimate the above equations. The coefficients presented in this table are the marginal effects of given variables on investment rate given that the lower censoring limit is set at 0%. The dependent variable in columns [1], [2] and [3] is the production investment rate and in columns [4], [5] and [6] is the non-production investment rate. In columns [2], [3], [5] and [6], we includes two sets of interaction terms, one between industry dummies and year dummies and one between province dummies and year dummies. In columns [3] and [6], we include three suspected endogenous variables: credit constraints, receiving government assistance and selling asset. Panel B presents the heterogeneity, caused by ownership type, in response to uncertainties. We include industry dummies and province dummies in all specifications.

Table 6: Determinants of production investment share

	[1]	[2]	[3]	[4]
Lagged labor (log)	0.048***	0.049***	0.046***	0.048***
	[0.013]	[0.013]	[0.014]	[0.014]
Lag asset/labor	-0.001	0	-0.002	0
	[0.006]	[0.006]	[0.006]	[0.006]
Lagged BPI	-0.071	-0.08	-0.071	-0.081
	[0.059]	[0.058]	[0.059]	[0.059]
Full utilization (lagged, dummy)	0.005	0.005	0.003	0.004
	[0.019]	[0.019]	[0.020]	[0.019]
Previous borrowing relations with banks (dummy)	-0.016	-0.005	-0.019	-0.007
	[0.019]	[0.019]	[0.021]	[0.021]
Demand as a major constraint (dummy)	-0.048**	-0.049**	-0.050**	-0.052**
	[0.022]	[0.022]	[0.022]	[0.022]
Lagged sales	-0.019**	-0.020**	-0.020**	-0.020**
	[0.009]	[0.009]	[0.010]	[0.010]
Idiosyncratic uncertainty (lagged)	-0.159	-0.168*	-0.16	-0.170*
	[0.097]	[0.097]	[0.098]	[0.097]
Macro uncertainty (lagged)		2.967**		3.293**
		[1.280]		[1.354]
Contacts in banking sector (lagged, in log)	0	0	0	0
	[0.004]	[0.004]	[0.004]	[0.004]
Contacts in political system (lagged, in log)	0.002	0.002	0.002	0.002
	[0.003]	[0.003]	[0.003]	[0.003]
% of sales as final consumptions goods (lagged)	0.033*	0.032	0.032	0.031
	[0.020]	[0.020]	[0.020]	[0.020]
Lack of collateral for borrowing from banks	-0.061		-0.062	
	[0.046]		[0.046]	
Cost of finance (lagged)	0.044	0.025	0.047	0.026
	[0.059]	[0.058]	[0.061]	[0.061]
Owner/Manager have technical degree	0.004	0.004	0.004	0.004
	[0.018]	[0.018]	[0.018]	[0.018]
Owner/manager's gender	0.025	0.023	0.026*	0.023
	[0.015]	[0.015]	[0.015]	[0.015]

Firm's age	-0.013	-0.009	-0.011	-0.009
	[0.016]	[0.016]	[0.018]	[0.018]
Being a corporate firm	0.043*	0.050**	0.043*	0.050**
	[0.023]	[0.023]	[0.023]	[0.023]
Locating in urban area (dummy)	0.040**	0.037**	0.043**	0.039**
	[0.018]	[0.018]	[0.018]	[0.018]
Credit constraints		0.028*		0.027*
		[0.016]		[0.016]
Receiving government assistance		-0.015		-0.015
		[0.016]		[0.016]
Selling assets		0.202***		0.201***
		[0.077]		[0.077]
Selling assets * Macro uncertainty		-0.32		-0.318
		[0.348]		[0.348]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy	Yes	Yes	Yes	Yes
Province dummy * year dummy	Yes	Yes	Yes	Yes
Year dummies	Yes	No	Yes	No
Correction bias			Yes	Yes
N	1915	1915	1915	1915

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Random effect tobit estimation is used to estimate the above equations. The dependent variable in this table is the share of production investment in total investment. The coefficients presented in this table are the marginal effects of given variables on production investment share. In all columns, we include two sets of interaction terms, one between industry dummies and year dummies and one between province dummies and year dummies. In columns [3] and [4], we correct the selection bias following procedure proposed by Semykina and Wooldridge (2010). We include industry dummies and province dummies in all specifications.

Table 7: Basic statistics for exit and survival firms

		Attrition	Confirmed exit	Survival firms
Number of firms		223	491	3419
Lagged labor	Mean	57.22	10.52	14.11
	SD	150.90	21.20	26.73
Regular buyers	Mean	4.18	4.03	4.24
	SD	1.10	1.21	1.09
Idiosyncratic uncertainty	Mean	0.09	0.09	0.09
	SD	0.06	0.07	0.07
Macro uncertainty	Mean	0.18	0.20	0.19
	SD	0.08	0.08	0.08
Firms as major income sources	Mean	0.85	0.81	0.89
	SD	0.36	0.39	0.32
Home as production site	Mean	0.42	0.39	0.43
	SD	0.49	0.49	0.50
Have more than one products	Mean	0.12	0.10	0.12
	SD	0.33	0.30	0.32
% of sales as final consumptions goods	Mean	0.32	0.35	0.38
	SD	0.39	0.40	0.41
Receiving government assistance (dummy)	Mean	0.25	0.21	0.29
	SD	0.43	0.41	0.45
Credit constraints (dummy)	Mean	0.31	0.27	0.27
	SD	0.47	0.45	0.44
Firm's age	Mean	13.35	14.17	15.08
	SD	9.97	8.68	9.80
Locating in urban area (dummy)	Mean	0.64	0.60	0.49
	SD	0.48	0.49	0.50
Being a corporate firm	Mean	0.43	0.20	0.22
	SD	0.50	0.40	0.41

Table 8: Impact of idiosyncratic uncertainty and macro uncertainty on firm's exit decision (marginal effects)

	Exit 1		Exit 2	
	[1]	[2]	[3]	[4]
Lagged labor (log)	-0.060***	-0.056***	-0.033***	-0.033***
	[0.017]	[0.017]	[0.006]	[0.007]
Lagged labor squared (log)	0.011***	0.010***		
	[0.003]	[0.003]		
Regular buyers (log)	-0.034*	-0.033*	-0.029*	-0.029*
	[0.017]	[0.017]	[0.015]	[0.015]
Idiosyncratic uncertainty (lagged)	0.024		0.069	
	[0.079]		[0.069]	
Macro uncertainty (lagged)	0.286***		0.304***	
	[0.073]		[0.066]	
Corporate firms * idiosyncratic uncertainty		-0.089		0.059
		[0.132]		[0.118]
Sole proprietorship * idiosyncratic uncertainty		0.093		0.074
		[0.099]		[0.084]
Corporate firm * Macro uncertainty		0.114		0.285**
		[0.134]		[0.125]
Sole proprietorship * Macro uncertainty		0.362***		0.311***
		[0.087]		[0.076]
Firms as major income sources	-0.059***	-0.059***	-0.053***	-0.053***
	[0.017]	[0.017]	[0.014]	[0.014]
Home as production site	-0.025**	-0.025**	-0.022**	-0.022**
	[0.012]	[0.012]	[0.010]	[0.010]
Have more than one products	-0.002	-0.003	0.004	0.004
	[0.018]	[0.019]	[0.017]	[0.017]
% of sales as final consumptions goods (lagged)	0	0	-0.011	-0.012
	[0.017]	[0.017]	[0.015]	[0.015]
Receiving government assistance (dummy)	-0.043***	-0.042***	-0.035***	-0.035***
	[0.014]	[0.015]	[0.013]	[0.013]
Credit constraints (dummy)	0.006	0.007	-0.001	-0.001
	[0.013]	[0.013]	[0.011]	[0.011]
Firm's age	-0.035***	-0.035***	-0.023**	-0.023**

	[0.010]	[0.010]	[0.009]	[0.009]
Locating in urban area (dummy)	0.065*	0.054*	0.079***	0.079***
	[0.036]	[0.029]	[0.029]	[0.029]
Being a corporate firm	0.01	0.076*	0.01	0.017
	[0.017]	[0.040]	[0.015]	[0.036]
N	4133	4133	3910	3910

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
We include industry dummies and province dummies as control variables in all specifications. In column [1] and [2], exit firms include all firms that did not participate in the round *t+1* of survey, given participating in round *t (t=1, 2, 3)*. It means that exit firms are both confirmed exit firms and attrition firms. In columns [3] and [4], exit firms include only confirmed exit firms. Attrition firms are treated as missing firms and not include in the estimation.

Appendix A1: Net production investment rate under uncertainty

	[1]	[2]	[3]	[4]
Lagged labor (log)	0.064***	0.069***	0.069***	0.072***
	[0.019]	[0.019]	[0.019]	[0.019]
Lagged labor squared (log)	-0.008**	-0.008**	-0.008**	-0.009***
	[0.003]	[0.003]	[0.003]	[0.003]
Lag asset/labor	-0.029***	-0.027***	-0.027***	-0.027***
	[0.005]	[0.005]	[0.005]	[0.005]
Lagged BPI	-0.043	-0.036	-0.036	-0.043
	[0.048]	[0.048]	[0.048]	[0.048]
Full utilization (lagged, dummy)	0.062***	0.055***	0.055***	0.056***
	[0.015]	[0.015]	[0.015]	[0.015]
Previous borrowing relations with banks (dummy)	0.013	0.014	0.014	0.013
	[0.015]	[0.015]	[0.015]	[0.015]
Demand as a major constraint (dummy)	-0.025	-0.018	-0.018	-0.018
	[0.017]	[0.017]	[0.017]	[0.017]
Lagged sales	0.016**	0.013*	0.013*	0.012*
	[0.007]	[0.007]	[0.007]	[0.007]
Idiosyncratic uncertainty (lagged)	-0.189**	-0.205***	-0.205***	-0.211***
	[0.078]	[0.078]	[0.078]	[0.078]
Systematic uncertainty (lagged)			0.143	0.229
			[0.908]	[0.907]
Contacts in banking sector (lagged, in log)	0.007**	0.007**	0.007**	0.006**
	[0.003]	[0.003]	[0.003]	[0.003]
Contacts in political system (lagged, in log)	0.001	0.001	0.001	0.002
	[0.002]	[0.002]	[0.002]	[0.002]
% of sales as final consumptions goods (lagged)	0.029*	0.032**	0.032**	0.033**
	[0.015]	[0.015]	[0.015]	[0.015]
Lagged cost of finance	-0.042	-0.022	-0.022	-0.021
	[0.044]	[0.044]	[0.044]	[0.044]

Lack of collateral for borrowing from banks	-0.087**	-0.083**	-0.083**	
	[0.038]	[0.038]	[0.038]	
Credit constraints				-0.02
				[0.012]
Receiving government assistance				0.041***
				[0.013]
Selling assets				0.170**
				[0.066]
Selling assets * systematic uncertainty				-0.164
				[0.298]
Owner/Manager have technical degree	0.003	0.003	0.003	0.004
	[0.014]	[0.015]	[0.015]	[0.014]
Owner/manager's gender	-0.007	-0.008	-0.008	-0.007
	[0.012]	[0.012]	[0.012]	[0.012]
Firm's age	-0.042***	-0.043***	-0.043***	-0.040***
	[0.012]	[0.012]	[0.012]	[0.012]
Being a corporate firm	0.019	0.021	0.021	0.026
	[0.019]	[0.019]	[0.019]	[0.019]
Locating in urban area (dummy)	0.036**	0.035**	0.035**	0.035**
	[0.014]	[0.014]	[0.014]	[0.014]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy		Yes	Yes	Yes
Province dummy * year dummy		Yes	Yes	Yes
N	3332	3332	3332	3332

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Random effect tobit estimation is used to estimate the above equations. The coefficients presented in this table are the marginal effects of given variables on investment rate given that the lower censoring limit is set at 0%. The dependent variable is the net production investment rate (i.e. the ratio of net production investment to total asset) .

Appendix A2: Robustness check with alternative measurement of idiosyncratic uncertainty

Dependent variables	[1] Ratio of production investment at t to physical asset at t-1	[2] Ratio of production investment at t to physical asset at t-1	[3] Ratio of non-production investment at t to physical asset at t-1	[4] Ratio of non-production investment at t to physical asset at t-1
Lagged labor (log)	0.070***	0.073***	0.026	0.042
	[0.019]	[0.019]	[0.035]	[0.034]
Lagged labor squared (log)	-0.008**	-0.009***	-0.026***	-0.030***
	[0.003]	[0.003]	[0.008]	[0.008]
Lag asset/labor	-0.027***	-0.027***	-0.076***	-0.079***
	[0.005]	[0.005]	[0.018]	[0.018]
Lagged BPI	-0.033	-0.043	0.129	0.123
	[0.048]	[0.048]	[0.098]	[0.098]
Full utilization (lagged, dummy)	0.055***	0.056***	0.033	0.043
	[0.015]	[0.015]	[0.037]	[0.037]
Previous borrowing relations with banks (dummy)	0.015	0.014	0.086***	0.062*
	[0.015]	[0.015]	[0.033]	[0.032]
Demand as a major constraint (dummy)	-0.018	-0.019	0.063	0.066*
	[0.017]	[0.017]	[0.040]	[0.040]
Lagged sales	0.013*	0.012*	0.121***	0.118***
	[0.007]	[0.007]	[0.032]	[0.030]
Idiosyncratic uncertainty (lagged)	-0.206**	-0.208**	0.035	0.075
	[0.086]	[0.086]	[0.170]	[0.169]
Systematic uncertainty (lagged)	0.13	0.213	-6.271***	-5.600***
	[0.909]	[0.908]	[1.817]	[1.705]
Contacts in banking sector (lagged, in log)	0.007**	0.006**	0.014*	0.012*
	[0.003]	[0.003]	[0.007]	[0.007]
Contacts in political system (lagged, in log)	0.001	0.002	-0.002	-0.001
	[0.002]	[0.002]	[0.005]	[0.005]
% of sales as final consumptions goods (lagged)	0.031**	0.032**	0.087**	0.089**
	[0.015]	[0.015]	[0.041]	[0.041]
Lack of collateral for borrowing from banks	-0.083**		-0.061	
	[0.038]		[0.061]	
Credit constraints		-0.02		-0.147***
		[0.012]		[0.037]

Receiving government assistance		0.041***		0.132***
		[0.013]		[0.039]
Selling assets		0.157**		0.628
		[0.066]		[0.587]
Selling assets * systematic uncertainty		-0.066		-2.2
		[0.297]		[2.155]
Cost of finance (lagged)	-0.022	-0.022	-0.029	0.001
	[0.044]	[0.044]	[0.169]	[0.168]
Owner/Manager have technical degree	0.004	0.004	0.004	0
	[0.015]	[0.014]	[0.033]	[0.034]
Owner/manager's gender	-0.009	-0.008	-0.044*	-0.037
	[0.012]	[0.012]	[0.026]	[0.026]
Firm's age	-0.043***	-0.040***	-0.034	-0.034
	[0.012]	[0.012]	[0.031]	[0.031]
Being a corporate firm	0.021	0.025	0.029	0.033
	[0.019]	[0.019]	[0.041]	[0.040]
Locating in urban area (dummy)	0.035**	0.036**	-0.025	-0.03
	[0.014]	[0.014]	[0.035]	[0.037]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy	Yes	Yes	Yes	Yes
Province dummy * year dummy	Yes	Yes	Yes	Yes
N	3332	3332	3332	3332

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Random effect tobit estimation is used to estimate the above equations. The coefficients presented in this table are the marginal effects of given variables on investment rate given that the lower censoring limit is set at 0%. The dependent variable in columns [1] and [2] is the production investment rate and in columns [3] and [4] is the non-production investment rate. This table is a replicate of Table 4. However, in this table, we use the alternative measurement of uncertainty, which is 3-year rolling standard deviation of error terms obtained from estimating a profit rate equation following AR procedure.

Appendix A3: Impact of imperfect capital market on investment

	[1]	[2]	[3]	[4]
Dependent variables	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1	Ratio of production investment at t to physical asset at t-1	Ratio of non-production investment at t to physical asset at t-1
Lagged labor (log)	0.067***	0.022	0.072***	0.025
	[0.019]	[0.035]	[0.019]	[0.035]
Lagged labor squared (log)	-0.008**	-0.025***	-0.009**	-0.026***
	[0.003]	[0.007]	[0.003]	[0.008]
Lag asset/labor	-0.029***	-0.078***	-0.027***	-0.076***
	[0.005]	[0.018]	[0.005]	[0.018]
Lagged BPI	-0.047	0.105	-0.04	0.13
	[0.048]	[0.095]	[0.048]	[0.097]
Full utilization (lagged, dummy)	0.062***	0.036	0.054***	0.033
	[0.015]	[0.039]	[0.015]	[0.037]
Previous borrowing relations with banks (dummy)	0.013	0.093***	0.014	0.086***
	[0.015]	[0.032]	[0.015]	[0.032]
Demand as a major constraint (dummy)	-0.025	0.065	-0.018	0.063
	[0.017]	[0.041]	[0.017]	[0.040]
Lagged sales	0.016**	0.122***	0.013*	0.121***
	[0.007]	[0.033]	[0.007]	[0.032]
Contacts in banking sector (lagged, in log)	0.007**	0.012*	0.007**	0.014*
	[0.003]	[0.007]	[0.003]	[0.007]
Contacts in political system (lagged, in log)	0.001	0.001	0.001	-0.002
	[0.002]	[0.005]	[0.002]	[0.005]
% of sales as final consumptions goods (lagged)	0.030**	0.087**	0.032**	0.086**
	[0.015]	[0.040]	[0.015]	[0.041]
Cost of finance (lagged)	-0.041	-0.028	-0.021	-0.029
	[0.044]	[0.160]	[0.044]	[0.169]
Lack of collateral for borrowing from banks	-0.087**	-0.064	-0.084**	-0.061
	[0.038]	[0.062]	[0.038]	[0.061]
Owner/Manager have technical degree	0.004	0.006	0.004	0.004
	[0.014]	[0.033]	[0.015]	[0.033]

Owner/manager's gender	-0.006	-0.039	-0.008	-0.044*
	[0.012]	[0.026]	[0.012]	[0.026]
Firm's age	-0.042***	-0.035	-0.043***	-0.034
	[0.012]	[0.030]	[0.012]	[0.031]
Being a corporate firm	0.018	0.026	0.02	0.03
	[0.019]	[0.042]	[0.019]	[0.042]
Locating in urban area (dummy)	0.036**	-0.025	0.035**	-0.025
	[0.014]	[0.034]	[0.014]	[0.035]
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes
Industry dummy * year dummy			Yes	Yes
Province dummy * year dummy			Yes	Yes
N	3332	3332	3332	3332

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Random effect tobit estimation is used to estimate the above equations. The coefficients presented in this table are the marginal effects of given variables on investment rate given that the lower censoring limit is set at 0%. This table is a replicate of Table 3. However, in this table, we drop all the uncertainty variables from our estimation.