Family firms and investments

Bianco, Madga, Golinelli, Roberto and Parigi, Giuseppe
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Magda Bianco
Bank of Italy and ECGI

Roberto Golinelli
University of Bologna

Giuseppe Parigi
Bank of Italy

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Magda Bianco
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Abstract

Family firms are a widespread control structure in most countries, especially among smaller firms. A vast literature addresses the question of whether they are performing better or worse than comparable non family firms, with not entirely conclusive results. Here we take a different, indirect approach and test whether investment decisions in family firms are more sensitive to uncertainty than in other firms. By using a novel dataset that includes both a better definition of family firms than commonly used (through self evaluation) and a very good proxy of the uncertainty on future demand that firms face, we are able to verify that – as compared to other firms – family firms are significantly more sensitive to uncertainty: this might contribute to explain why in some situations they perform better, whereas in others they do worse. We find evidence that this greater sensitivity to uncertainty in family firms is basically due to the effects of risk aversion and capital irreversibility, where the latter appear to be associated to a greater opaqueness of family firms rather than to the degree of sunkness of fixed capital. Finally, we propose some evidence that the prevalence of family firms in Italy might be associated to long standing institutional factors, such as an inefficient law enforcement system and a low social capital.

Keywords: Family firms, investments, uncertainty, risk aversion, capital irreversibility

JEL Classifications: G32, G38

Magda Bianco *
Bank of Italy
Via Nazionale 91
00184 Roma
Italy
phone: +39 06 4792 4119 , fax: +39 06 4792 5332
e-mail: magda.bianco@bancaditalia.it

Roberto Golinelli
University of Bologna - Department of Economics
Strada Maggiore 45
40125 Bologna, 40125
Italy
phone: +39 051 209 2638 , fax: +39 051 209 2664
e-mail: roberto.golinelli@unibo.it

Giuseppe Parigi
Bank of Italy
Via Nazionale 91
00184 Rome
Italy
e-mail: giuseppe.parigi@bancaditalia.it

*Corresponding Author

1. Introduction[1]

A vast literature studies the behavior and performance of (mainly listed) family firms, trying to assess whether they are better or worse performers than other firms, under a number of respects. Although not entirely conclusive, these contributions show that family firms might be more profitable (or show higher market valuation) only under certain conditions, i.e. when they are managed by the founder.

In this paper we concentrate on one aspect that has been only recently explicitly analyzed and which might shed some light on the "dynamics" of family firms behavior, i.e. their investment decision process and more specifically their reaction to uncertainty. Our hypothesis is that family firms are on average more risk averse than other firms, because of, for example, a higher share of the owner's wealth invested in the firm. In this case, their investments should be more negatively correlated with uncertainty.

The question is particularly relevant in Italy, a country characterised by a subdued growth over the last 10 years, as compared both to the past and to international competitors. One of the proposed explanations is that the concentrated control structure prevailing in Italy has limited the necessary ownership transfers and the investments needed for the restructuring of some sectors and companies. One of the reasons might be the widespread family ownership structure: if family firms are more risk averse and because of this more reactive to uncertainty, this might explain their insufficient reaction with respect to restructuring needs in a changing environment. It remains to be evaluated whether the higher reactivity to uncertainty of family firms allows a better evaluation of risk in a longer term perspective.

Our analysis might also help in explaining different results on family firms performance. Family firms might be an optimal governance structure in certain contexts or periods but inefficient in others. Morck and Yeung (2009) suggest that concentrated structures might be better (or even necessary) in periods of recovery (when stability is needed and risk taking is not a good strategy) but not when major innovations (e.g. the IT revolution) have to be exploited.

The paper is articulated as follows: after a brief survey of the literature on family firms (par. 2), we present our methodology to analyze firms' investment strategies (par. 3). Our main

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results are discussed in par. 4, while the following one qualifies them and tests their robustness. Par. 6 offers some evidence on the underlying reasons for the diffusion of family firms in Italy. Par. 7 concludes.

2. Family firms and performance

One of the fundamental issues in the literature on the performance of family firms concerns their definition: Miller et al. (2007) show how many different definitions for family firms have been used in the literature, ranging from "*organizations controlled and usually managed by multiple family members, often from multiple generations*" to "*founding family or founding individual*". Given the difficulty of identifying precisely whether the company is run by a family, often a threshold of ownership is used (i.e., when the largest owner is an individual and has a share larger than some threshold, it is assumed to be a family run business). In most cases the analyses are referred to listed companies.

In the literature there is convergence on the conclusion that family firms appear extremely common in most countries[2], including the US (Anderson and Reeb, 2003). In Europe, Barontini and Caprio (2006) find that 53% of their sample of listed companies (which excludes the UK) is controlled by a family, with Finland and the Netherlands having the lowest percentages (the Netherlands approximately 35%) and Italy and Belgium the highest (Italy more than 75%). Franks et al. (2009) provide evidence of a convergence of governance structures across European countries (with the notable exception of Italy): in Germany and France they observe a trend towards a more dispersed ownership (and hence towards a reduced importance of family firms) across the 1000 largest firms.

Results on family firms performance are not homogenous. Claessens et al. (2002) for Southeast Asian countries, Morck et al. (2000) for Canada, Cronqvist and Nilsson (2003) for Sweden find that family firms are characterized by a worse performance. Bertrand and Schoar (2006) show that stronger family ties (as measured in the World Values Survey) are associated with a larger fraction of total market value controlled by families, but also with lower levels of per capita GDP, fewer publicly traded firms and a smaller average size of firms. Family firms also seem to be associated with weaker managerial practices (Bloom and Van Reenen, 2007 and Bandiera et al., 2008, for the Italian case).

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2 See e. g., Bertrand and Schoar (2006), Barontini and Caprio (2006).

On the other hand, Khanna and Palepu (2000) for India, Sraer and Thesmar (2007) for France, Barontini and Caprio (2006) for continental Europe and Favero et al. (2006) for Italy find a better performance for family firms. In particular, Barontini and Caprio show that (listed) family firms tend to use more than other firms control-enhancing mechanisms, but controlling for their adoption (which is found to be wealth reducing) show that family firms outperform the others.

A number of (more recent) analyses have concentrated on a specific period in the life of family firms, i.e. the transfer of ownership to heirs[3]. In general, the evidence converges in finding that a better performance of family firms is associated to the founder, whereas heirs' controlled firms typically show a worse performance[4].

More related to our analysis, Cucculelli (2008) examines the responsiveness of company sales to changes in market demand for different ownership structures in European firms (approximately 8.000 firms over the period 1995-2004). He finds that family firms – even if they outperform other types of ownership in terms of profitability measures - show a lower than average growth rate and that their sensitivity to industry shocks is lower than other types of firms. He concludes that family firms are less able to seize market opportunities than firms with industrial and financial company ownership. Schmid et al. (2008) show that, in a sample of German listed firms, family ones are less diversified into unrelated business segments, but not in related segments. Finally, Barba Navaretti et al. (2008) show that Italian family firms export less than others: according to the authors, this might be due to their higher risk aversion.

3. Empirical strategy

In what follows we concentrate on the *investment decisions* of firms: we believe that by considering firms' dynamic behavior we might indirectly shed some light on their results in terms of performance.

More specifically we want to analyze whether family firms' investment behavior is more sensitive to uncertainty as compared to non family firms. As typically the entrepreneur has a large share of wealth invested in the family firm, we expect that her risk aversion is higher than in cases of dispersed ownership or other control structures. Under this respect, our analysis is

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3 See Ellul et al (2009),Cucculelli and Micucci (2008).

4 See Villalonga and Amit (2006), Morck et al., (2000); Bennedsen et al. (2007), Adams et al (2008), Perez-Gonales (2006).

complementary to that of Michelacci and Schivardi (2008) and of Barba Navaretti et al. (2008), who offer some evidence of the negative reactions of family firms to idiosyncratic risk.

Compared to the available literature on family firms, we consider firm investment behavior and not their performance (but see, with a slightly different perspective, Andres (2008), who considers the sensitivity of firms' investment to cash flow availability. Secondly, we use a sample of *unlisted* Italian companies, whereas most of the analyses refer to listed companies; we believe it is extremely relevant to shed some light on the behavior of these companies which account for a large share of production (value added) in most countries. Finally, our definition of family firm is based on self-assessment (see below for the details) and not derived from the comparison between ownership shares and a threshold, inevitably affected by some degree of arbitrariness. We believe this ensures a much more precise identification of family firms and their decisions.

3.1 Datasets and variables

Our dataset is the result of three main sources: the Survey on Investment in Manufacturing (SIM), the Company Accounts Data Service (CADS), and the breakdown by sector of the National Account data (NA).

The SIM is a survey conducted annually by the Bank of Italy on a sample of – approximately 3000 – Italian firms (belonging to the industrial and service sectors), providing unique information on firms' investment plans, their expected demand, the range between its minimum and maximum expected growth rate for the following year (henceforth, the min-max range), the existence of credit constraints, some characteristics of firm governance. By considering the whole sample of firms in the period 1996-2007, which we use as our sample period because all (or most) variables are available for these years, the total number of observations is 32,925 (company-year cases), of which 26,040 belong to the manufacturing sector. Excluding the manufacturing firms with less than 50 employees, for which the information on uncertainty is not available, and the no response cases, the sample shrinks to 12,130 observations[5].

To compute a proxy for "uncertainty" we use the min-max range of the expected growth rate of demand. Specifically, if ${}_t g_{it+1}$ is the expected growth rate of the i^{th} company's demand between t and $t+1$ at constant prices and SAL_{it} the value at current prices of the i^{th}

[5] See Banca d'Italia (2008).

company's sales in *t* (both variables taken from SIM), then expected level of sales (at constant prices) in *t+1* is ${}_tY_{it+1} = \left(1+{}_tg_{it+1}\right) Y_{it}$, where $Y_{it} = \frac{SAL_{it}}{PY_{it}}$ and PY_{it} is the individual sales' deflator[6]. We define uncertainty about the future demand growth rate, $u\left({}_tg_{it+1}\right)$, as the min-max range of the expected growth rate at constant prices reported by the SIM respondents[7], $u\left({}_tY_{it+1}\right) = u\left({}_tg_{it+1}\right) Y_{it} = \left({}_tg_{it+1}^{max} - {}_tg_{it+1}^{min}\right) Y_{it}$. This measure may actually be taken as a simplified version of that proposed in Guiso and Parigi (1999)[8].

From the SIM dataset we also obtain a set of variables describing the firm's governance structure. Since 2006 the survey includes a question on whether the firm identifies itself as a "family" or "non family" firm (the first being described as a firm that is directly or indirectly controlled by an individual or a group of individuals linked by family relationships). We believe this is a better definition than most of those used in the literature, which rely on proxies based on the characteristics of the direct owners of the company (only in some cases on the ultimate owners) and which might give a distorted representation. For example, in our sample approximately 70 per cent of firms define themselves as family controlled, whereas if we considered as family firms those where the largest shareholder is an individual we would have 44 per cent of the firms; if we further required that the individual owns at least 20 per cent of the shares we would only have 39% of the companies.

Prior to 2006, firms are classified as family or non family by exploiting a specific question contained in the 2007 survey: whether the firm did not change control since its foundation and in case it did, whether before the change it was a family or non family firm. We complemented this information with others on: direct ownership (since it might matter for our analysis whether the family firm belongs to a group structure - hence its direct owner is not an

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6 Individual sales' deflators are obtained by applying the SIM growth rate for year *t* to the previous year NA deflator level of the sector to which the firm belongs. We use NA sector deflator levels when SIM growth rates are not available.

7 In the 2005 survey the min max range was substituted for by a more complex question on the firms' whole probability distribution of the expected growth rate of demand (as in the 1993 survey used by Guiso and Parigi, 1999). In order to obtain comparable observations for year 2005, we have computed a min-max version for 2005 by assuming that the min-max range corresponds to the width of a 90% normal confidence interval around the average expected growth of future demand. This hypothesis has been validated by regressing (without intercept) the available min-max ranges of 2004 and 2006 against the 2005 standard deviation. The estimates - 3.12 and 3.37 respectively - corroborate the amplitude of a 90% interval centered around the mean which, for a normal distribution, would be equal to 2×1.65=3.3; R^2 coefficients are both larger than 40%, suggesting a good explanatory power of the hypothesis.

8 Since not all firms with more than 49 employees report the min-max range, we run a probit regression of non-response probability against time dummies and a set of observable characteristics, such as industry, location, type of ownership, size, and share of exported production. The only significant effect concerns public and large firms, which are less likely to report the min-max range, hopefully because the respondents are not close enough to the top management to provide a suitable answer. Therefore, the loss of information due to non-responses should prevent large measurement errors for the min-max range.

individual but another company - which might imply a reduced risk aversion); on the control structure of the firms, such as the presence of shareholders' agreements or by-laws clauses stabilizing control; on the concentration of ownership; and on the stability of control.

Accounting initial values for capital stock estimation (see Appendix A1.2) and cash flow have been obtained from the CADS database. After merging the SIM and CADS datasets, the total number of observations available for the empirical analysis drops to 12,002, which appears to be an adequate representation of Italian manufacturing firms by size, sector and geographical location (see Table A1.1 in Appendix A1).

3.2 Descriptive evidence: family firms in Italy

Over 70 per cent of Italian firms (with more than 50 employees) are family firms (see Table 1). As expected, they are more common among smaller firms (but also 30 per cent of those with more than 1000 employees define themselves as family controlled) and less spread in the Centre-North; they are more frequent in traditional sectors (textile-clothing comes first) and less in the energy and chemical sectors. Among non family firms we find foreign controlled firms, state owned ones, dispersed ownership and financially controlled companies.

The governance structure of family and non family firms differs (Table 2). On average, ownership concentration (measured by the share of the largest shareholder) is lower among family firms: typically the largest shareholder has a lower share with respect to non family firms, whereas the second and third shareholders (typically family components) have relatively larger shares. This could help explain why control stabilizing mechanisms – such as shareholders' agreements and bylaws restricting share transfers - are more frequent among family firms.

The characteristics of the "head of the company" (defined in the questionnaire as the individual who actually manages the company) appear to differ according to the type of firm. In family firms, the head of the company is in fewer cases foreign, but more often a female; whereas the average age does not differ, the level of education does: among family firms it is less frequent that the head of the company has a degree or has attended specialization courses.

Finally, Table 3 shows that on average family firms are characterized by lower planned and actual investment; exports (analogously to the finding of Barba Navaretti et al., 2008), capital/labor ratio and labor productivity than non family firms.

3.3. The econometric analysis

Our starting point is the assumption that the ownership structure of a firm may affect its investment decision through a different reaction to the uncertainty on the evolution of its product demand.

A vast empirical literature has been devoted to the analysis of the investment-uncertainty relationship, finding generally that the relationship is negative and significant. The intensity of the link is however dependent on the interplay of: a) different assumptions regarding the degree of competition on the product market, b) technological characteristics of the production function (constant versus non-constant returns to scale) and of its inputs (essentially labor and capital). More specifically, in highly competitive markets and/or with perfectly flexible inputs firms should be less sensitive to uncertainty; actually, in perfectly competitive markets the sign of the investment-uncertainty relationship may even become positive (the so called Hartman-Abel effect). The opposite applies for firms with some degree of market power and/or more irreversible or less flexible inputs.

Following Guiso and Parigi (1996, 1999) and, more recently, Bontempi et al. (2009) we specify an empirical model where investment decisions are irreversible and the demand threshold triggering investment rises with uncertainty. In this context, Abel and Eberly (1994, 1996, and 1997) show that the optimal trigger point is equal to the user cost of capital adjusted to account for irreversibility and uncertainty. By raising the user cost of capital uncertainty reduces the elasticity of both the decision to invest and the amount of the investment with respect to demand.

This framework seems particularly useful for the analysis of the effects of ownership structure. If different ownership structures imply different degrees of risk aversion and this affects the role of irreversibility in the decision to invest, the trigger point should be higher for family firms, especially when these are "directly" controlled by an individual (i.e. the family does not control the company through a chain of other companies).

Let $mvp = a(K/y)^{-1/\gamma}$ be the marginal value product of capital evaluated at the current level of the stock of capital, K, and of demand y; a is a constant and $0 < \gamma < 1$ a parameter representing the characteristics of the production function. Let $c(u)$ be the user cost of capital which, under the hypothesis of irreversibility of investment, is positively affected by uncertainty about future demand, u.

With no adjustment costs and ignoring depreciation, the firm's optimal level of capital stock is $K^* = y(c(u)/a)^{-\gamma}$ and the corresponding investment policy is: $I = K^* - K > 0$ if $mvp > c(u)$ or $K < y(c(u)/a)^{-\gamma}$. When $mvp \le c(u)$, or $K \ge y(c(u)/a)^{-\gamma}$, investment should be set to zero.

The latter case would be a natural test of the irreversibility theory but it is very difficult to implement because observations with zero investment are extremely rare (lower than 3 per cent of the total number of our observations). This is true especially when using data on "total" investment, which aggregates different types of capital goods, such as buildings, equipment and so on: firms may plan zero investment in buildings but positive investment in other categories[9]. However, the virtual absence of zero-investment observations should not alter the relationship between uncertainty and the user cost of capital that is at the root of our analysis of investment decisions.

We therefore concentrate on the case $mvp > c(u)$, so that $K^* = y(c(u)/a)^{-\gamma}$. In this context, the investment rate can be shown to be a function of demand, uncertainty and the inherited capital stock according to the following empirical equation for panel data:

$$(1) \qquad \frac{{}_tI_{it+1}}{K_{it}} = \mu_i + \tau_t + \alpha_1 \frac{{}_tY_{it+1}}{K_{it}} \left[1 + \alpha_2 \frac{u\left({}_tY_{it+1}\right)}{K_{it}} \right] + \alpha_3 \frac{I_{it}}{K_{it-1}} + \xi' Z_{it} + \varepsilon_{it+1}$$

where subscripts *i* and *t* respectively indicate the i^{th} company (i = 1, 2, …, N) and the year t (t = 1, 2, …, T). K_{it} is the stock of capital measured at the end of *t*; ${}_tI_{it+1}$ and I_{it} respectively represent the investment planned at year *t* for the following year and the realized investment in *t*; ${}_tY_{it+1}$ is the level of demand expected at the end of year *t* for the following year; $u\left({}_tY_{it+1}\right)$ represents the firm's uncertainty about demand in *t+1* as perceived in *t*. All previous variables are measured at constant prices. Z_{it} is a vector of additional controls accounting for exceptional events, such as extraordinary operations, and ε_{it+1} is the stochastic error term measuring shocks to investment plans in *t+1*. Detailed definitions and data sources are in Appendix A1.

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[9] Bloom et al. (2003, 2007) study the irreversibility theory with aggregation effects. Guiso and Parigi (1999) present some estimates for three different types of capital goods, equipment, structures and vehicles, confirming the results obtained for the total aggregate; more recently, Bontempi et al. (2004) extend the fundamental *q* approach to the case of two capital inputs: equipment and structures.

Fixed effects μ_i and τ_t refer to firms and time; they account for individual unobservable characteristics influencing the investment-uncertainty relationship and for a degree of dependency over time across companies due to collectively significant effects. Hence, they reduce biases due to the omission of unobservable time-invariant individual effects and of effects almost invariant for all companies, such as industry-wide shocks, macroeconomic cyclical effects and widespread optimism-pessimism.

Parameters α_1, α_2 and α_3 are scalars, ξ is a vector. While α_1 is expected to be positive, according to the irreversibility literature the *a priori* sign of α_2 should be negative and significant; however, if the Hartman-Abel set-up applies, α_2 should be positive or not significantly different from zero.

In model (1) the dynamic nature of the investment decision is taken into account by having a positive α_3 parameter measuring the effect of the lagged realized investment (i.e. the actual implementation of the plans in *t-1* for year *t*, which *is not* the lagged dependent variable) to approximate the effects of the adjustment costs, delivery lags, and so on. However, since the available time span of twelve years (from 1996 to 2007) enables the assessment of the existence of more complex dynamic adjustments, we included in the model also the actual lagged dependent variable, exploiting the information about the investment plans made in *t-1* for *t*. Equation (1) then becomes:

$$(2) \qquad \frac{{}_tI_{it+1}}{K_{it}} = \mu_i + \tau_t + \alpha_1 \frac{{}_tY_{it+1}}{K_{it}}\left[1 + \alpha_2 \frac{u\left({}_tY_{it+1}\right)}{K_{it}}\right] + \alpha_3 \frac{I_{it}}{K_{it-1}} + \beta_1 \frac{{}_{t-1}I_{it}}{K_{it-1}} + \xi' Z_{it} + \varepsilon_{it+1}$$

The dynamics components of equation (2), $\alpha_3 \frac{I_{it}}{K_{it-1}} + \beta_1 \frac{{}_{t-1}I_{it}}{K_{it-1}}$, can be rearranged such as: $\alpha_3\left(\frac{I_{it}}{K_{it-1}} - \delta \frac{{}_{t-1}I_{it}}{K_{it-1}}\right)$, where $\delta = -\frac{\beta_1}{\alpha_3}$. In this new formulation, $\alpha_3 < 0$ implies a long run adjustment of the investment plans towards the effective investments, and δ may be interpreted as a factor of correction which contributes to identify the (last) perceived gap at the time new investment plans are set. When $\alpha_3 + \beta_1 = 0$, $\delta = 1$ and firm investment plans for *t+1* are not only a function of future demand but also of the gap between past investment plans and their realizations: $\frac{{}_{t-1}I_{it}}{K_{it-1}} - \frac{I_{it}}{K_{it-1}}$. In other terms, the plans for *t+1* include a share of the unrealized plans in the previous period (see Eisner, 1978). In a framework of rational investment plans[10], the gap can only be determined by "news" (new information obtained between *t-1* ant *t*), which we assume to feed back to future plans.[11] As such, the exclusion of this term from the planned investment relationship in equation (1) should not affect the α_1, and α_2 parameter estimates.

4. Investment decisions and uncertainty: main results

Before we proceed with the estimation, we also consider some generalization of expression (2), taking into account medium and long run effects of uncertainty (see Eberly and van Mieghem, 1997, and Bloom et al., 2007), by considering alternative functional forms and other investment determinants.

First, since the interaction between uncertainty and expected demand might actually capture second-order term in the Taylor approximation of the relationship between investment plans and expected demand, the inclusion of the squared expected demand (appropriately scaled by capital stock) tests for evidence of non-linearity - through the β_2 parameter in equation (3) below.

Secondly, it might be that uncertainty on one-year-ahead demand growth has an additional, direct effect on investments (*i.e.* not intermediated by the demand). To account for this, we may include in our specification alternative measures of uncertainty (such as the min-max range of demand growth), summarized by the u_{it} term in equation (3) below. The sign of the β_3 parameter is a *priori* uncertain, while α_2 captures the effects of uncertainty as suggested by the irreversibility literature.

A negative effect of uncertainty on investment might also proxy for credit constraints: if they are due to the company's inherent riskiness, this would imply that riskier firms may be more liquidity-constrained and hence plan a lower amount of investments. This possibility is addressed by including a measure of the firm's cash flow net of dividend paid, CF_{it}, to take into account liquidity constraints.

By considering these extensions, equation (2) becomes:

[10] As tested in Guiso and Parigi (1999).

[11] In an extended framework, equation (2) can be interpreted as the planned investments relationship of a (two-equations) vector equilibrium correction model explaining both sides of the adjustment process between plans and actual investments; as far as the adjustment model for actual investment is concerned. See, e.g., Bloom et al. (2003, 2007).

$$(3)\quad \frac{{}_tI_{it+1}}{K_{it}} = \alpha_i + \tau_t + \alpha_1 \frac{{}_tY_{it+1}}{K_{it}}\left[1 + \alpha_2 \frac{u\left({}_tY_{it+1}\right)}{K_{it}}\right] + \alpha_3 \frac{I_{it}}{K_{it-1}} + \beta_1 \frac{{}_{t-1}I_{it}}{K_{it-1}} + \beta_2 \frac{{}_tY_{it+1}^2}{K_{it}} + \beta_3 u_{it} + \beta_4 \frac{CF_{it-1}}{K_{it-1}} + \xi' Z_{it} + \varepsilon_{it+1}$$

Equation (3) is our general model, and its estimates are reported in the first three columns of Table 4, respectively for the family and the non-family sample, and for the sum of the two subsets (family & non family)[12].

Having a dynamic panel model, we apply the GMM estimators proposed by Arellano and Bond (1991) and instrument not only the lagged dependent variable but all other determinants as well; the comparison of alternative estimators is presented in Appendix A.2.

All the diagnostic tests in Table 4 show a basic congruence of our model with data. Moving from the general model (columns (1)-(3)) to more restricted ones, all the extensions considered above (i.e., squared demand effects, uncertainty levels and credit constraints) appear to be never significant both for the family and non family subsamples as well as for their union (see the p-values of the null hypothesis that $\beta_2 = \beta_3 = \beta_4 = 0$ in the last row of Table 4). This is why in the remainder of the paper we will consider equation (2) as our baseline model.

Columns (4) and (5) report the results for the "intermediate" model in equation (2), which show remarkable differences between the estimates of the core parameters for the family and non family samples. Family firms plans appear to be more reactive to expected demand: for a given level of uncertainty, the elasticity of investment plans to expected demand is four times as higher than for non family firms. However, family firms investment decisions are more sensitive to uncertainty: the uncertainty parameter α_2 estimate appears to be significant and higher in absolute terms in the family subsample (it is not even significant in the non family sample). In this case, a reduction of the degree of uncertainty from the third to the first quartile of its subsample distribution induces an increase in planned investments of approximately 2% for the median family firm, while investment plans of non-families are nearly unchanged (in the whole sample, the low α_2 estimates - though statistically significant - implies a mere 0.25% increase in investment plans associated to an equal uncertainty reduction).

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12 Additional sensitivity analyses were conducted by including in model (3) the uncertainty measure in differences, further lags of the cash flow variable and alternative credit rationing indicators as suggested by Guiso and Parigi (1999). Since parameter estimates of these variables are largely not significant while the other model's estimates do not depart from the baseline results in Table 4, they are not reported but available upon request.

Differences between family and non family firms emerge also from the estimates of the dynamic components of the model. The results in column (7) show that family firms investment plans embody about 40% of the gap between previous year plans and realizations, thus suggesting that their investment decision may follow a sort of adaptive behavior. This could be interpreted as an indication that family firms plans are more influenced by a longer term perspective. In effect, non family firms - column (8) – seem to follow a sort of autoregressive behavior, as more than 10% of their future plans is explained by the level of their past plans.

5. The sources of irreversibility

The next step in our analysis is to identify what drives the sensitivity to uncertainty for family firms. Even if relevant by itself, this result might be better understood – in its positive and negative implications – only by addressing its underlying sources. In the literature, a number of factors have been shown to help explain the responsiveness of investment to uncertainty: capital irreversibility, market power, risk aversion (see e.g. Guiso and Parigi, 1999, and Bontempi et al., 2009).

5.1 Investments' irreversibility and market power?

It might be argued that the strong reactivity of family firms plans to uncertainty is due either to a larger share of irreversible investments and/or to their higher market power (or lower competition) in the sectors where they are active.

The average value of some of our variables for family and non family firms might give some support to this interpretation (see Table 3). In fact, only 74% of family firms bought capital goods on second hand markets, as compared to 79% of non family firms; buildings (highly non reversible) represent a larger share of investments for family than for non family firms. This might suggest that family firms investments are actually – for some reasons – more irreversible.

Some support – at the descriptive level – receives also the hypothesis of higher market power of family firms (their price-cost margins are on average higher) and/or lower exposure to intense competition (family firms export a lower share of their output).

In order to test whether results for family firms as in column (4) of Table 4 might have been due to irreversibility and market power effects, we run a sequence of stability tests for the main parameters of interest (α_1, α_2, α_3 and β_1 in equation 2). The testing strategy is based on the inclusion in (2) the interaction of each regressor (expected demand, uncertainty, and lags of actual and planned investments) with a dummy variable selecting family firms with either reversible capital or high market power: under the null hypothesis of no break, the estimates of the interaction terms should not be significant.

The first four columns of Table 5 show the p-values of the standard normal statistic of the shift of each parameter of interest (the last column reports the p-values of the χ^2 statistic corresponding to the joint null of no shift). The overall picture is fairly clear: notwithstanding the different proxies used both for capital irreversibility and market power, it appears that the investment-uncertainty relationship in the family firms case cannot be simply due to the joint effect of a higher market power and/or a higher irreversibility of the capital stock.

5.2 Irreversibility due to opaqueness?

Up to now, we have considered a standard definition of irreversibility which is associated to the existence of a secondary market for (used) capital goods. The results of the previous section seem to suggest that we should adopt a broader concept of irreversibility, by taking explicitly into account the role of information on the secondary markets. More specifically, it might be that family firms investments are "perceived" by the market to be more irreversible because they carry a kind of "lemon" risk: this might be due to the fact that family firms are more opaque, hence less information is available on the actual value of their investments, which might become sunk for this reason[13].

The relevance of this effect may be tested indirectly, by observing that firms tend to be more opaque where law enforcement is less efficient or where trust among agents is lower. We take this into account by using proxies for both trust and law enforcement, our hypothesis being that a high trust and/or a good law enforcement should reduce the opaqueness of family firms and - through this mechanism - the irreversibility of their investment.

We proxy the level of trust with an average of the "trust" measure from the World Value Survey over the two waves where Italy was included (and alternatively with a measure of social capital based on blood donation and election turnout). As a proxy of the effectiveness of

13 We are grateful to Luigi Guiso for this suggestion.

law enforcement we use the length of ordinary civil proceedings in Italian provinces for the years 2000-2005 (a long length means low enforcement).

Results are presented in Table 6 and show that family firms' investments are in fact more sensitive to uncertainty in columns (3) and (5), where trust is lower than its median level or when law enforcement is worse than its median value.[14] These results are robust to the use of other measures related to social capital, such as blood donation and election turnout (results are available upon request).

Overall, the results of the last two sections show that the higher uncertainty effect on family firms investment plans is not associated to a greater investment irreversibility in a standard sense but rather to a different type of irreversibility, enhanced by the environment. In areas where trust is lower or enforcement is worse family firms' capital stock seems to be less easily evaluated by the market and hence more sunk. This induces a greater caution in the investment process. Under this respect, the greater sensitivity to uncertainty of family firms is rather a sign of a backward and inefficient environment. We shall come back to this issue when we try to understand where family firms are more common.

5.3 Risk aversion due to concentrated wealth

Another factor which may influence the relationship between investments and uncertainty in the context of family firms is the degree of risk aversion of the agent controlling the firm. A common assumption is that, since the owner might have a large share of its wealth invested in the firm, this induces a higher risk aversion and hence a greater sensitivity to uncertainty.

Given the lack of data on the share of the owner's wealth which is sunk in the firm, we try nonetheless to evaluate the uncertainty effects by considering: a) firms where the owner is an individual and b) cases where ownership concentration is high: if the controlling agent's wealth were diversified across a number of investments (and hence not concentrated in the firm), it should not make a difference whether the firms is controlled by an individual with a high or low ownership share.

Focusing the analysis specifically on family firms where the largest direct shareholder is an individual (about 58% of all the 620 family firms in our sample) allows to take into account

[14] Opposite to what just described for family firms, non families do not support a change in planned investments reactiveness to uncertainty conditional to different degrees of trust and/or law enforcement. Non family firms never present a significant effect of uncertainty on investment plans, independently of the subsample on which we refer to.

those cases where it is more likely that the owner has invested a large share of wealth in the firm (whereas for a family firm which is controlled through other companies – e.g. a pyramid - it might be more likely that each single owner has managed to diversify her investments).

The results of the estimation of (2) in this specific case are reported in the first four columns of Table 7. Along the columns, estimation is performed using alternative samples of data: all the family firms (F, in column 1); all the observations for family-firms directly controlled by an individual (FM, column 2); only observations for family-firms directly controlled by an individual, where the first owner's share is lower than 60% (FMB, column 3); only observations for family-firms directly controlled by an individual, where the first owner's share is larger than 60% (FMA, column 4).

The 60% threshold used in columns (3) and (4) is the average share of the largest owner in our sample but it is obviously arbitrary; hence, following Domowitz et al. (1986), we also consider an alternative specification of equation (2) which includes a new variable given by the interaction between uncertainty and variations in ownership concentration, X_{it}:

$$(4) \qquad \frac{{}_tI_{it+1}}{K_{it}} = \mu_i + \tau_t + \alpha_1 \frac{{}_tY_{it+1}}{K_{it}} \left[1 + (\alpha_2 + \omega\, \mathrm{X}_{it}) \frac{u({}_tY_{it+1})}{K_{it}} \right] + \alpha_3 \frac{I_{it}}{K_{it-1}} + \beta_1 \frac{{}_{t-1}I_{it}}{K_{it-1}} + \xi' Z_{it} + \varepsilon_{it+1}$$

In the simplest case (see column 5), X_{it} is the share of the largest shareholder, entailing the assumption of a linear relationship between the size of the (negative) uncertainty effect and that share. The uncertainty effect grows with the share if $\omega < 0$. In addition, the subsequent columns (6) and (7) respectively report the estimation results of equation (4) where the relationship between uncertainty and the share is assumed to be log-linear and inverse.[15]

As expected, the larger financial involvement of the largest shareholder leads to a substantial increase in the sensitivity to uncertainty (see the value of $\hat{\alpha}_2$ in column (2) and the correspondent semi-elasticity of plans to uncertainty, which more than doubles, from 2.00 for the full sample of family firms to 5.43).

Estimates in columns (3) and (4) in Table 7 suggest that also ownership concentration matters: if the largest owner's share is above 60%, the absolute value of $\hat{\alpha}_2$ further increases. Given the small sample size on which these estimates are based, it is probably more informative to analyze the results in the last three columns of Table 7, where the parameters of equation (4) are estimated over the larger sample (as in column 2) under alternative assumptions about the

[15] Though not reported, the restrictions that lead from the general to the models in Table 7 are never rejected, and the diagnostic tests support the validity of the specification.

uncertainty-share relationship. In column (5) the effect of uncertainty on investment plans for family firms controlled by an individual varies over time and across individuals according the linear relationship: $\hat{\alpha}_{2,it} = -0.0704 - 0.0934$ **largest shareholder*, where $\hat{\omega}$ is significantly negative at the 10% level. Hence ownership concentration seems to proxy the share of the owner's wealth invested in the company: when this increases, sensitivity to uncertainty increases.

The result is robust to the two different specifications in columns (6) and (7), The alternative patterns of the uncertainty effect on investment plans with respect to growing shares of the first owner are reported in top-down plots of Figure 1 for: *(a)* the linear specification, *(b)* the logarithmic and *(c)* the inverse one, together with the two α_2 estimates in the below/above 60% subsamples, see columns (3) and (4) of Table 7. All results point to a substantial increase of investment plans sensitivity to uncertainty when the share of the first owner is higher[16].

5.4 Some extensions

a) More complex structures (groups vs non groups). We also distinguish more generally between family firms belonging to a group and those which do not. Being in a group might reduce the sensitivity of investment to uncertainty, if this is mainly related to the concentration of the owner's wealth in the company. A more complex and structured organization might imply that a lower share of the controlling agent's wealth is directly involved in the company we are considering and that internal capital markets in the group allow resources to be allocated in a way to relax some of the constraints to investments.

In Table 8 we split the family firms sample in column (1) into those which do and do not belong to a group, column 2 and 3 respectively. As expected, being part of a group induces a significantly lower investment sensitivity to uncertainty.

b) The "founder" effect. We also checked whether some "specificities" in ownership and control structure might have affected our results or might help to qualify them. In order to relate with the literature on a positive "founder" effect on the firms' performance, we tested whether a stable control since the firm's foundation affects the responsiveness of family firms to uncertainty; results are in Table 9.

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[16] It is interesting to notice that, if we repeat the exercise for non family firms (where the threshold for the largest owner share is below/above 96%, corresponding to the third quartile of the share distribution for NF, $\hat{\alpha}_2$ for concentrated ownership is negative and significant whereas for low concentration firms is not. The value of $\hat{\alpha}_2$ is however half of that of corresponding family firms.

When the controlling agent is the founder as defined in the 2002 survey (see column 2 in Table 9 [17]), uncertainty has a stronger effect on investment plans than that in the whole sample of family firms (in column 1, where results are reported again to ease comparisons). This might be due to a stronger desire of keeping the control of the firm that may induce a higher risk aversion. This result is interesting especially if compared with those in the literature finding that founder family firms perform better than the others: founder family firms might be in general more profitable (due to the specific ability of the founder), but might be also more risk averse.

Other measures of the stability of control (such as the presence of shareholders' agreements or bylaws restricting share transfers) do not seem to affect the results, implying that it is not stability per se which increases or reduces the responsiveness to uncertainty[18].

As a whole we have found that investment behavior of family firms is strongly affected by uncertainty and that this uncertainty is partly associated to firms' control structure (e.g. ownership concentration), an endogenous variable, and partly to the environment, exogenous to firms' choices.

The ultimate effects of these characteristics of family firms' behavior has to be further explored. We have seen (Table 3) that on average they show (over the whole period considered) a lower productivity: it might be that, since on average the uncertainty over demand has been relatively similar for family and non family firms, this has produced lower investment patters and hence in the medium term, lower productivity.

6. Why so many family firms?

The results in the previous sections show that family firms are characterised by a high sensitivity to uncertainty, stemming from a broad concept of irreversibility - where considerations about the quality and the availability of information on the firm matter more than the economic and physical characteristics of the capital goods - and from a higher degree of risk aversion of the owner. These factors may have weighted on the investment decision process of the firms, with negative repercussions on their long term performance. Yet, family firms continue to be fairly numerous, in Italy as well as in other countries, putting this issue on top of the research agenda.

In the literature (see e.g., Bertrand and Schoar, 2006, for a survey), family firms are alternatively considered as an "efficient device", which allows to obtain a superior performance,

[17] The results do not change when the founder is defined according to the 2006 survey (see column 5).
[18] The results are available upon request.

or are "culturally determined" objects, whose values may induce certain behavior of the founder (or heirs) implying to forego financial returns in order to maximize her (their) overall utility.

According to the first set of theories, family firms may have a longer term horizon, entailing less "short-termism" and myopia. They might ensure better incentives and stricter (and less costly) monitoring on management. Moreover, within the family the transmission of knowledge might be easier, especially in sectors of activity closer to artisan-like production (but less where an external education is more relevant or where technological innovation matters).

On the other hand, family firms might emerge due to "cultural values", not necessarily associated to economic efficiency. These might induce an "excessive" desire to keep control within the family, with a long term (possibly excessive) commitment to the survival of the company itself. The idea that a culture based on strong family ties may limit development is not new (see Bertand and Schoar, 2006; Bertrand et al., 2008): Weber claims that family values may restrain the development of capitalist economic activities which need more individualism and less nepotism. Banfield (1958) suggests that the "amoral familism" in the South of Italy induces small firm size and slower development: there might be a trade-off between trust among small groups of kins and trust in the society at large. A similar argument is put forward by Fukuyama (1995). Furthermore, if the founder is mainly interested in keeping the company within the family, this might induce her to select her successor among (the rather small set of) her heirs rather than on the market, with negative effects on efficiency (Burkart et al., 2003). Another possibility (not exclusive with respect to the previous one) is that family ties serve as a second best solution where legal structures are weak: trust between family members can be a substitute for missing contractual enforcement (or more specifically for weak investor protection).

At the international level there is not a clear consensus on the accepted explanation (see Betrand and Schoar, 2006): family firms appear to be more common in countries where "family values" (proxied by the responses to the World Value Survey) are more important.

Hence the question is why do we have such a large number of family firms in Italy? Given our results that – at least in certain circumstances – they appear to have a longer term perspective but might be a source of competitive disadvantage, it seems relevant to analyze the reasons of the diffusion of this governance structure.

The model explaining the share of family on total firms by region or by province ($shareF_g$) is obtained by averaging over g (where g denotes a region or province) the individual binary choices[19] of the firms belonging to *g*. If we assume that the individual choice to be or not to be a family depends on the institutional and social environment in which firms operate (listed in the explanatory vector *W*) plus a random shock ε_i measuring the *i*-th firm preferences and assessment about such environmental features, the aggregate model becomes:

$$shareF_g = const + \gamma \, W_g + \varepsilon_g \quad (5)$$

Equation (5) explains the share of family firms in *g* using a number of variables related to the institutional and social framework (W_g), proxied by the level of trust and social capital, the effectiveness of legal enforcement and the efficiency of the public administration. Obviously some of them (especially the "trust" variable) might be endogenous, but most of these independent variables are extremely persistent over time (however, we do not know how persistent is the family firm relevance). In the regressions we also control for the level of development by introducing per capita GDP. Table A1.2 in Appendix A1 lists and describes all the variables in *W*.

Since in equation (5) the random shock ε_g (which averages over *g* individual ε_i) is heteroskedastic (its variance depends on the number of firms in *g*) parameters are estimated through generalized least squares by assuming that the errors variance is positively related to the number of firms in *g*.

We consider two alternative specifications. In one specification the first principal component has been extracted from the explicative variables in *W;* given the strong collinearity among these variables a single factor ($F1_g$) explaining about the 65% of the total variation in *W* data has been identified[20].

In a second specification, all the independent variables have been included and the most efficient specification selected: in this case, the significant variables appear to be *trust*, the length of civil proceedings (*duration*) and the administrative costs for starting a business (*cost*). The same model is also estimated by using log-transformed regressors.

Results in Table 10 refer to both regional (columns 1-3) and provincial (columns 4-6) data aggregation levels. Specifically, columns (1) and (4) present results obtained using the first

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[19] The 0-1 indicator is available from SIM database since the year 2006. In what follows we report results obtained by using data about 2007, but they are robust to the use of the year 2006.

[20] The weights to compute $F1_g$ from *W* data are reported in the last two columns of Table A1.2 for respectively regional and provincial data: alternative levels of data aggregation lead to a very similar structure of parameters and their signs suggest that the more favorable the environment for business is, the more positive $F1_g$.

specification, columns (2) and (5) the second, and columns (3) and (6) those using the log-linear transformation of the same explanatory variables.

These findings, even if obviously deserving further analysis, are in line with other results on the determinants of the size of Italian companies (Cingano, Pinotti, 2009) and suggest that the reasons for the prevalence of this model might be searched also in long standing characteristics of Italian institutions (and their inefficiency).

7. Conclusions

In the paper we offer a contribution to the understanding of the behavior of family firms by considering their investment decision process as compared to non family firms.

By doing this we also offer some insights to the literature that compares the performance of family and non family firms. The investment decisions of family firms appear to be more sensitive to uncertainty than those of other firms. This behavior appears to be associated both to the irreversibility of investment decisions, especially due to an environment that enhances the opacity of family firms, and to a greater risk aversion of family firms.

While this suggests that investment behavior of family firms might be a source of limited growth, the analysis of the actual link between investment decisions and productivity and output growth requires obviously further investigations.

Some preliminary evidence on the determinants of the diffusion of this governance structure in Italy suggests the relevance of institutional factors such as the level of trust among people (so that family links might substitute for more impersonal ones), the degree of inefficiency of the judicial system (possibly reducing the degree of protection for external financiers) and the inefficiency of local administrations (which might be an obstacle to further growth). This suggests that – even if in a number of cases it might be and efficient governance structure – a family firm structure might often represent a second best response to an inefficient environment.

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Table 1 - **RELEVANCE OF FAMILY FIRMS IN ITALY**

	% of firms
N. of firms	71.10
Employment	55.1
Revenues	39.1
Size (by employees)	
50 – 100	76.8
100 – 200	69.7
200 – 500	61.5
500 – 1000	50.4
> 1000	30.4
Area	
North – Center	70.1
South – Islands	79.7
Sectors	
Food Tobacco	77.1
Textile – clothing	80.9
Chemicals	53.5
Non met. Minerals	74.0
Mechanical	72.9
Wood, paper	73.9
Extraction, energy	31.3

Source: SIM Database, 2006.

Table 2 - **CHARACTERISTICS OF FAMILY *VS* NON FAMILY FIRMS**

	Family firms	Non family firms
Largest shareholder	62.6	82.5
2nd largest shareholder	18.1	8.1
3rd largest shareholder	8.0	2.4
Median n. of shareholders	3	2
% of shareholders' agreement	12.8	10.8
% of bylaws restricting transf.of shares	49.8	36.5
Head of firm:		
Nationality		
Italian	98.2	94.5
Eu	1.3	4.1
Rest of world	0.5	1.3
Gender		
Male	90.2	91.7
Female	9.8	8.3
Education		
Middle school	9.1	5.3
Secondary	45.5	35.1
Degree	40.9	49.8
Post degree	3.8	5.4
Specialization	0.8	4.4
Age	56.9	55.3

Source: SIM Database, 2006.

Table 3 **SAMPLE MEANS OF SELECTED VARIABLES**

	Family	Non family	Family and Non family	Manuf. firms
Continuous Variables [1]				
Planned investment/stock of capital	0.148	0.160	0.153	0.158
Actual investment/stock of capital	0.171	0.176	0.173	0.179
Expected demand/stock of capital	5.61	6.08	5.83	5.89
Actual demand/stock of capital	5.78	6.26	6.00	6.15
Demand uncertainty measure [2]	0.457	0.473	0.464	0.481
Min-max range of expected demand	0.084	0.084	0.084	0.087
Buildings/total investment	0.171	0.131	0.153	0.150
Cash flow/stock of capital	0.296	0.288	0.292	0.282
Price-cost margin, PCM	0.089	0.070	0.080	0.076
Share of exported output	0.351	0.378	0.364	0.359
Capital/labour ratio	52.8	90.7	70.5	65.3
Output/labour ratio	188.5	226.5	206.2	198.9
Dummy variables				
Credit rationed firms	0.035	0.023	0.029	0.036
Geographic location				
- North-west	0.360	0.399	0.378	0.384
- North-east	0.125	0.157	0.140	0.152
- Centre	0.261	0.300	0.280	0.268
- South	0.255	0.143	0.203	0.197
Firms producing only one product	0.351	0.323	0.338	0.337
Employees ≤ 100	0.374	0.230	0.307	0.313
100 < Employees ≤ 500	0.524	0.560	0.541	0.539
Employees > 500	0.102	0.211	0.153	0.148
Reversible capital [3]	0.740	0.792	0.765	0.776
Observations	4506	3932	8438	12002
Number of firms	1009	796	1805	2959
Average T	4.47	4.94	4.67	4.06

([1]) Measured at constant prices (1994=1). ([2]) Min-max range of expected demand growth times the level of demand over the stock of capital. ([3]) A company has “reversibility capital” if it uses the opportunity to buy in the second-hand and/or in the leasing markets at least once during the sample period.

Table 4 - **FROM GENERAL-TO-SPECIFIC MODELLING APPROACH** [(1)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
model:		general [(3)]			intermediate [(4)]			specific	
sample [(2)]:	F	NF	F&NF	F	NF	F&NF	F	NF	F&NF
α_1	**0.0171**	**0.0090**	**0.0099**	**0.0190**	**0.0050**	**0.0073**	**0.0183**	**0.0049**	**0.0072**
	0.0051	0.0040	0.0037	0.0056	0.0020	0.0030	0.0055	0.002	0.0031
α_2	**-0.0488**	**-0.0069**	**-0.0095**	**-0.0592**	**-0.0142**	**-0.0213**	**-0.0603**	**-0.0141**	**-0.0215**
	0.0188	0.0101	0.0082	0.0172	0.0167	0.0093	0.0173	0.0166	0.0091
α_3	**-0.3046**	**-0.0138**	**-0.2396**	**-0.3589**	**0.0128**	**-0.2754**	**-0.4121**		**-0.2879**
	0.1651	0.0513	0.1793	0.1671	0.0555	0.2007	0.1225		0.0747
β_1	**0.4266**	**0.1271**	**0.2675**	**0.4494**	**0.1206**	**0.2853**	**0.4121**	**0.1259**	**0.2879**
	0.1147	0.0246	0.0910	0.1052	0.0256	0.0987	0.1225	0.0094	0.0747
β_2 [(5)]	**-0.0002**	**-0.0100**	**-0.0086**						
	0.0160	0.0063	0.0055						
β_3	**-0.0901**	**0.1399**	**-0.1549**						
	0.1045	0.1300	0.1068						
β_4	**0.0368**	**0.0193**	**0.0254**						
	0.0249	0.0214	0.0184						
Elasticity to:									
exp. demand				**0.80**	**0.19**	**0.30**	**0.77**	**0.18**	**0.29**
				0.23	0.07	0.12	0.23	0.07	0.12
uncertainty [(6)]				**2.04**	**0.10**	**0.25**	**2.00**	**0.10**	**0.25**
				0.87	0.13	0.16	0.83	0.13	0.16
N	613	554	1167	620	556	1176	620	556	1176
Tbar	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6
N×T	2228	1952	4180	2258	1987	4245	2258	1987	4245
AC: [(7)]									
- 1st order	0.0022	0.0507	0.0011	0.0016	0.0480	0.0011	0.0108	0.0477	0.0016
- 2nd order	0.2732	0.7109	0.3846	0.3318	0.7437	0.4141	0.5396	0.7623	0.5335
Hansen [(8)]	0.6256	0.2368	0.2112	0.3414	0.2317	0.1802	0.3232	0.2412	0.1461
R^2 [(9)]	0.193	0.074	0.097	0.171	0.098	0.101	0.141	0.098	0.097
restrictions [(10)]				0.4520	0.2486	0.1061	0.2681	0.2259	0.1906

([1]) In bold, the GMM-dif estimates, see Arellano and Bond (1991); below there are the heteroschedasticity-consistent standard errors. ([2]) F = family firm; NF = non-family firm; F&NF = union of the two subsets. ([3]) See equation (3). ([4]) See equation (2). ([5]) Being the explanatory variable measured in millions, β_2 estimates reported in this table must be divided by 10^6. ([6]) % change of planned investments due to a reduction of uncertainty - for the median firm - from the third to the first quartile of the corresponding sub-sample distribution. ([7]) AC = p-values of the residual autocorrelation tests, see Arellano and Bond (1991). ([8]) P-values of the overidentifying restriction *J*-test, see Hansen (1982). ([9]) Squared correlation of actual and fitted data. ([10]) P-value of the χ^2 statistic testing for the joint parameters restrictions to the corresponding general model in the first three columns.

Table 5 – **TEST FOR SHIFTS IN FAMILY MODEL PARAMETERS**[1]

Shifted parameters:	α_1	α_2	α_3	β_1	*Joint*
Shift drivers:					
Reversibility measures [2]					
- Strong	0.348	0.871	0.109	0.445	0.258
- Weak, REV1	0.121	0.870	0.340	0.668	0.450
- Weak, REV2	0.856	0.665	0.211	0.523	0.624
- Weak, REV3	0.432	0.317	0.560	0.483	0.667
Market power measures					
- Price-cost margin below the sample median	0.120	0.188	0.827	0.209	0.375
- Share of exported output below the sample median	0.885	0.836	0.039	0.947	0.285

([1]) For equation (2) single parameter shifts, the *P*-values of the standard normal statistics are reported; for equation (2) joint parameter shifts the *P*-values of the χ^2-statistics are reported. ([2]) The reversibility indicators are obtained on the basis of the SIM information about transactions in the secondary market for capital goods and about leasing investment (see Bontempi et al., 2009, Appendix A.3). The strong reversibility indicator is obtained on the basis of single cases (company-year): reversibility occurs when the i^{th} company at time t explicitly uses the opportunity to buy in the second-hand and/or in the leasing markets.. The weak reversibility indicator is based on all the cases relating to the same company: a company belongs to the reversibility group if it uses the opportunity to buy in the second-hand and/or in the leasing markets at least once (REV1), twice (REV2) or three times (REV3) during the sample period.

Table 6 – **FAMILY FIRMS WHERE TRUST AND ENFORCEMENT ARE HIGH/LOW** [1]

	(1)	(2)	(3)	(4)	(5)
		Trust		Enforcement	
sample: [(2)]	F	high	low	high	low
α_1	**0.0190**	**0.0166**	**0.0241**	**0.0126**	**0.0299**
	0.0056	0.0059	0.0064	0.0054	0.0066
α_2	**-0.0592**	**-0.0470**	**-0.1214**	**-0.0396**	**-0.0827**
	0.0172	0.0104	0.0302	0.0142	0.0202
α_3	**-0.3589**	**-0.5142**	**0.0094**	**-0.3421**	**-0.0346**
	0.1671	0.1587	0.0439	0.1579	0.0591
β_1	**0.4494**	**0.4019**	**0.1726**	**0.1652**	**0.2412**
	0.1052	0.0675	0.0931	0.0704	0.0760
δ **[(3)]**	**1.25**	**0.78**	**-**	**0.49**	**-**
	0.37	0.18	-	0.27	-
Elasticity to:					
expected. demand	**0.80**	**0.70**	**0.99**	**0.53**	**1.24**
	0.23	0.25	0.26	0.22	0.27
uncertainty **[(4)]**	**2.04**	**1.41**	**5.30**	**0.90**	**4.46**
	0.87	0.56	2.05	0.42	1.50
N	620	259	315	365	354
Tbar	3.6	4.1	3.4	3.1	3.2
N×T	2258	1053	1060	1115	1120
R^2 **[(5)]**	0.171	0.236	0.081	0.033	0.153

([1]) In bold, the GMM-dif estimates of equation (2) parameters ("intermediate model"), see Arellano and Bond (1991); below there are the heteroschedasticity-consistent standard errors. ([2]) F = family firm; high/low trust (enforcement) = family firms which are based in areas where trust (enforcement) is above/below the median value (excluding the observations lying on median values). ([3]) The indirect estimates and the corresponding standard errors of δ are computed from $\delta = -\beta_1 / \alpha_3$ only when α_3 parameter is significantly different from zero. ([4]) % change of planned investments due to a reduction of uncertainty - for the median firm - from the third to the first quartile of the corresponding sub-sample distribution. ([5]) Squared correlation of actual and fitted data.

Table 7 - **FAMILY FIRMS MANAGED BY AN INDIVIDUAL: LOW / HIGH CONCENTRATION** [(1)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
sample: [(2)]	F	FM	FMB	FMA		FM	
interaction: ([3])					linear	log	inverse
α_1	**0.0190**	**0.0329**	**0.0254**	**0.0800**	**0.0364**	**0.0357**	**0.0361**
	0.0056	0.0106	0.0113	0.0261	0.114	0.108	0.108
α_2	**-0.0592**	**-0.0860**	**-0.0877**	**-0.0921**	**-0.0704**	**-0.1400**	**-0.1337**
	0.0172	0.0163	0.0195	0.0346	0.0113	0.0402	0.0361
ω					**-0.0934**	**-0.0295**	**0.0068**
					0.0633	0.0189	0.0044
α_3	**-0.3589**	**-0.4137**	**-0.3788**	**0.0640**	**-0.4520**	**-0.4458**	**-0.4442**
	0.1671	0.184	0.1963	0.1216	0.1729	0.1760	0.1777
β_1	**0.4494**	**0.3524**	**0.3295**	**0.1256**	**0.3448**	**0.3341**	**0.3290**
	0.1052	0.1009	0.1162	0.1043	0.0958	0.0994	0.1016
δ [(4)]	**1.25**	**0.85**	**0.87**	**-**	**0.76**	**0.75**	**0.74**
	0.37	0.26	0.35	-	0.23	0.24	0.24
Elasticity to:							
exp. demand	**0.80**	**1.51**	**1.13**	**3.90**	**1.69**	**1.62**	**1.65**
	0.23	0.49	0.51	1.26	0.53	0.50	0.50
uncertainty [(5)]	**2.04**	**5.43**	**4.12**	**15.13**	**8.18**	**10.60**	**9.02**
	0.87	1.76	1.76	8.48	2.46	3.61	2.90
N	620	362	254	108	355	355	355
Tbar	3.6	3.3	3.4	3.0	3.2	3.2	3.2
N×T	2258	1180	851	329	1143	1143	1143
R^2 [(6)]	0.171	0.138	0.149	0.231	0.126	0.126	0.122

([1]) Equation (2) for columns (1)-(4); equation (4) for columns (5)-(7). In bold the GMM-dif estimates, see Arellano and Bond (1991); below there are the heteroschedasticity-consistent standard errors. ([2]) F = all family firms; FM = family with a managing person; FMB = FM with the share of the first owner below 60%; FMA = FM with the share of the first owner above 60%. ([3]) Equation (4) in which the share of the first owner interacts with the uncertainty effect; the share respectively enters as a linear, logarithmic and inverse function. ([4]) The indirect estimates and the corresponding standard errors of δ are computed from $\delta = -\beta_1 / \alpha_3$ only when α_3 parameter is significantly different from zero. ([5]) % change of planned investments due to a reduction of uncertainty - for the median firm - from the third to the first quartile of the corresponding sub-sample distribution. ([6]) Squared correlation of actual and fitted data.

Table 8 - **FAMILY FIRMS IN/OUT OF GROUP** [(1)]

	(1) all family firms	(2) group	(3) non group
α_1	**0.0190**	**0.0167**	**0.0219**
	0.0056	0.0053	0.0091
α_2	**-0.0592**	**-0.0362**	**-0.0689**
	0.0172	0.0183	0.0161
α_3	**-0.3589**	-0.0179	**-0.4176**
	0.1671	0.0449	0.1833
β_1	**0.4494**	0.1159	**0.3807**
	0.1052	0.0817	0.0999
δ [(2)]	**1.25**	**-**	**0.91**
	0.37	-	0.27
Elasticity to:			
exp. demand	**0.80**	**0.67**	**0.95**
	0.23	0.21	0.39
uncertainty[(3)]	**2.04**	1.06	**2.82**
	0.87	0.60	1.24
N	620	243	392
Tbar	3.6	3.5	3.2
N×T	2258	844	1246
R^2 [(4)]	0.171	0.045	0.168

([1]) Equation (2); in bold the GMM-dif estimates, see Arellano and Bond (1991); below there are the heteroschedasticity-consistent standard errors. ([2]) The indirect estimates and the corresponding standard errors of δ are computed from $\delta = -\beta_1 / \alpha_3$ only when α_3 parameter is significantly different from zero. ([3]) % change of planned investments due to a reduction of uncertainty - for the median firm - from the third to the first quartile of the corresponding sub-sample distribution. ([4]) Squared correlation of actual and fitted data.

Table 9 - **FAMILY FIRMS AND CONTROL SINCE FOUNDATION** [1]

	(1)	(2)	(3)	(4)	(5)
sample: [2]	F	FF	FNF	FM	FMF
α_1	**0.0190**	**0.0223**	**0.0077**	**0.0329**	**0.0449**
	0.0056	0.0079	0.0081	0.0106	0.0149
α_2	**-0.0592**	**-0.0717**	**-0.2119**	**-0.0860**	**-0.0763**
	0.0172	0.0231	0.1593	0.0163	0.0120
α_3	**-0.3589**	**-0.4912**	**-0.2026**	**-0.4137**	**-0.4492**
	0.1671	0.1942	0.0844	0.1839	0.1851
β_1	**0.4494**	**0.4148**	**0.3275**	**0.3524**	**0.3063**
	0.1052	0.0439	0.0919	0.1009	0.1230
δ **(3)**	**1.25**	**0.84**	**1.61**	**0.85**	**0.68**
	0.37	0.31	0.48	0.26	0.26
Elasticity to:					
exp. demand	**0.80**	**1.05**	**0.32**	**1.51**	**2.15**
	0.23	0.37	0.35	0.49	0.71
uncertainty **(4)**	**2.04**	**3.89**	**2.88**	**5.43**	**7.39**
	0.87	1.97	1.58	1.76	2.90
N	620	112	81	362	205
Tbar	3.6	4.1	4.3	3.3	3.3
N×T	2258	463	345	1180	681
R^2 (5)	0.171	0.319	0.267	0.138	0.106

([1]) In bold the GMM-dif estimates of equation (2), see Arellano and Bond (1991); below there are the heteroschedasticity-consistent standard errors. ([2]) F = all family firms; FF = family firms controlled by the founder (from the SIM survey on 2002); FNF = family firms controlled by following generations of the founder (from the survey on 2002); FM = family with a managing person; FMF = FM controlled since foundation. ([3]) The indirect estimates and the corresponding standard errors of δ are computed from $\delta = -\beta_1 / \alpha_3$ only when α_3 parameter is significantly different from zero.. ([4]) % change of planned investments due to a reduction of uncertainty - for the median firm - from the third to the first quartile of the corresponding sub-sample distribution. ([5]) Squared correlation of actual and fitted data.

Table 10 – **SHARE OF FAMILY FIRMS BY REGION AND BY PROVINCE** [1]

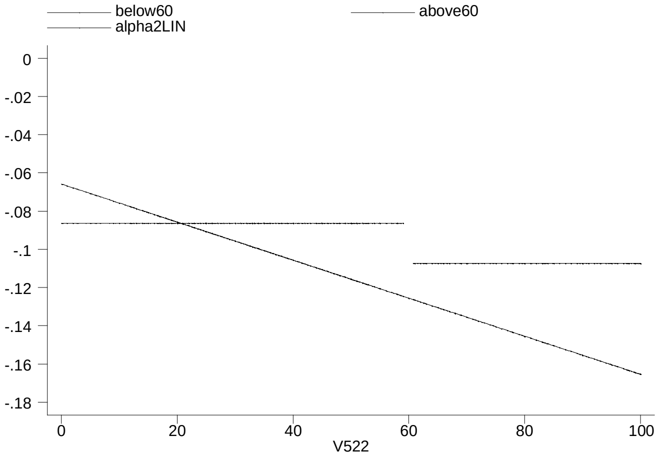
	data by region						data by province					
	(1) factor		(2) linear		(3) log-linear		(4) factor		(5) linear		(6) log-linear	
Explanatory												
F1	**-0.0702**	***					**-0.0751**	***				
	0.0211						0.0151					
trust			**-0.6446**	*	**-0.2280**	**			**-0.7827**	***	**-0.2454**	***
			0.3295		0.1020				0.2657		0.0793	
duration			**0.0004**	***	**0.3108**	**			**0.0003**	***	**0.2484**	***
			0.0001		0.1147				0.0001		0.0659	
cost			**-0.0086**	**	**-0.1281**				**-0.0062**	**	**-0.1046**	*
			0.0037		0.0766				0.0028		0.0561	
const	**0.5911**	***	**0.5670**	**	**-1.4089**	**	**0.5819**		**0.7022**	***	**-1.0709**	***
	0.0213		0.1943		0.6348		0.0152		0.1444		0.3728	
Obs.	20		20		20		95		95		95	
R^2	0.381		0.639		0.596		0.209		0.306		0.305	
SER	0.0944		0.0764		0.0808		0.1479		0.1400		0.1401	
F test (2)	11.08	***	9.44	***	7.88	***	24.61	***	13.40	***	13.32	***

([1]) GLS estimation of equation (5); below the estimates the standard errors are reported; ***, **, * denote 1%, 5% and 10% rejection of the null hypothesis. ([2]) Under the null, all the explanatory variables have parameters equal to zero.

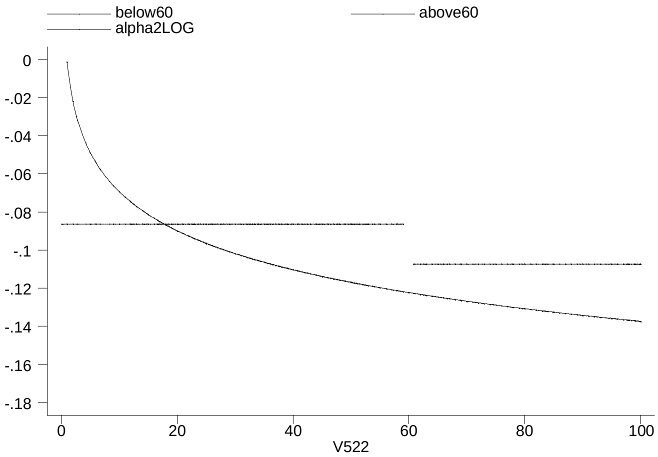
Figure 1

THE RELATIONSHIP BETWEEN UNCERTAINTY EFFECT ON PLANS AND THE % SHARE OF THE FIRST OWNER

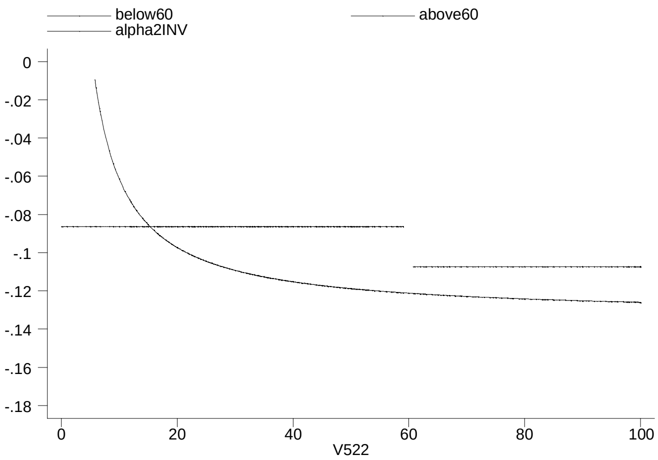
(a) linear relationship: $\hat{\alpha}_{2,it} = -0.0704 - 0.0934 \times v522_{it}$



(b) logarithmic relationship: $\hat{\alpha}_{2,it} = -0.14 - 0.0295 \times log(v522_{it})$



(c) inverse relationship: $\hat{\alpha}_{2,it} = -0.1337 + 0.0068 / v522_{it}$



Note. $\hat{\alpha}_{2,it}$ is reported along the vertical axes, *v522* (= largest shareholder) along the horizontal ones. The lines are traced on the basis of $\hat{\alpha}_2$ estimates in columns (3) and (4) of Table 7.

Appendix A1: Data sources and definitions

A1.1 – Effective and planned investments

From the SIM source, both effective and planned investments at current prices are available, disaggregated in three types of goods: structures, machinery and equipment; vehicles; non-residential buildings. For the i^{th} company (i = 1, 2, …, N, N = 4860) at year t (t = 1, 2, ..., T, T = 9, from 1996 to 2007), we indicate with INV_{it}^{j} and ${}_{t}INV_{it+1}^{j}$ the level of effective investment realised in t, and of the investment planned in t for $t+1$, respectively; the superscript j (= m or f) indicates the type of good. In this paper we choose to analyse the behaviour of investment in structures, machinery, equipment and vehicles (j = m), compared with that of buildings (j = f).[21]
The corresponding data at constant (1995) prices are obtained in the following way.
INV_{it}^{j} are deflated using the corresponding NA sectoral investment prices PI_{st}^{j} for all the companies belonging to s^{th} industry: $I_{it}^{j} = \frac{INV_{it}^{j}}{PI_{st}^{j}}$.[22]

The investment price for $t+1$ as perceived in t and used to deflate ${}_{t}INV_{it+1}^{j}$ is defined as: ${}_{t}PI_{it+1}^{j} = (1 + {}_{t}\pi_{it+1}^{j})PI_{st}^{j}$, where ${}_{t}\pi_{it+1}^{j}$ is the expected inflation of the j-type investment price (estimated from the SIM source)[23], and PI_{st}^{j} are the sectoral NA data defined above. Therefore, we obtain constant-prices planned investment as ${}_{t}I_{it+1}^{j} = \frac{{}_{t}INV_{it+1}^{j}}{{}_{t}PI_{it+1}^{j}}$.

A1.2 – Stock of capital

The data on capital stocks, at constant prices, are constructed on the basis of the perpetual inventory method by using CADS nominal book values as "accounting" initial capital stocks and effective investments described in previous section; for details see Bontempi et al. (2009)

A1.3 – Dummy and other control variables

Time. Time dummies classify observations along time: τ_t = 1 if the observation refers to time t, zero otherwise. Therefore, τ_t dummies can be estimated in panel models but not in cross-sections, and their presence allows for a degree of dependency across companies in the panel due to collectively significant effects.

Extraordinary operations. Three dummy variables equal to 1 if the company has been subject in t to: de-merger, business combination, and merger.

Zeros in the model's explanatory variables. Two dummy variables, equal to 1 when expected demand and effective lagged investment are respectively zero. Note that zeros in the min-max range of growth in

---

[21] SIM database reports, for each year in the sample, both preliminary and final investment figures. Given that the paper focuses on the explanation of planned investments for $t+1$, we prefer to use preliminary data because they are the only investment figures available in t, i.e. at the time new investments are planned. From statistical analyses, it turns out that preliminary and final data coincide for the large majority of cases (85 per cent for m goods and 91for f goods).

[22] Manufacturing activity is disaggregated into 13 sectors.

[23] From SIM, only the total-investment expected inflation, ${}_{t}\pi_{it+1}$, is available. Data for ${}_{t}\pi_{it+1}^{j}$ are estimated by exploiting the sectoral NA inflation differential of j-type investment with respect to the total m+ f, i.e.: ${}_{t}\pi_{it+1}^{j} = {}_{t}\pi_{it+1} + (\pi_{st+1}^{j} - \pi_{st+1})$, where $\pi_{st+1}^{j} = \frac{PI_{st+1}^{j} - PI_{st}^{j}}{PI_{st}^{j}}$ is the j-type investment price inflation rate, and the total investment price inflation is defined as $\pi_{st+1} = \frac{PI_{st+1} - PI_{st}}{PI_{st}}$.

expected demand are not marked with a dummy (as we did for demand and investment), because we interpret such result as "absence of uncertainty".

Credit rationing indicator. It is equal to 1 if the firm is credit-constrained. It is constructed using the answers to three questions on access to credit provided by the firms in the SIM sample. Specifically, firms are asked whether (i) at the current market interest rate they wish a larger amount of credit; (ii) they would be willing accept a small increase in the interest rate charged in order to obtain more credit; (iii) they have applied for credit but have been turned down. A company is classified as credit-constrained if, given a positive answer to either question (i) or (ii), it also answered "yes" to question (iii).

Reversibility indicator. The reversibility of the installed capital goods may be represented by an indicator based on transactions in the secondary market and on leased investment (*reverst*). It is a dummy variable equal to one if in t the i^{th} firm purchased or sold investment goods in the second-hand market or leased them, zero otherwise. Leased investment is considered reversible because normally, as part of the leasing contract, the client acquires the option to return the good. As a consequence, leasing companies only finance the purchase of goods that enjoy large second-hand markets. Given that the question about leased investment has been dropped since the 2003 survey, we constructed a second reversibility indicator (*REV*) at company level by collapsing annual *reverst* data by firm. *REV* is equal to one if collapsed *reverst* is bigger than 1, i.e. if the firm operated for at least two years either on the second-hand or the leasing markets during the sample period. Alternatively, we imputed missing *reverst* data on the basis of a probit model whose regressors are the usual dummy variables, see e.g. Bontempi et al. (2007, Section 3).

Cash flow, net of dividends paid. It is a no-dummy control variable. Individual data at current prices are from CADS database: CD_{it} = cash flow (item 9.14) minus dividends (item 7.6). In order to obtain data at constant prices, CD_{it} has been deflated using PY_{st} (the by-industry production deflator from NA, see e.g. Bond and Meghir, 1994): $CF_{it} = \frac{CD_{it}}{PY_{st}}$. In analogy with explanatory effective investment in *t-1*, in our model the cash flow regressor has been scaled by lagged stock of capital.

Table A1.1

COMPOSITION OF SAMPLE BY SIZE, INDUSTRY AND LOCATION

	Population [1]		Our sample [2]
	>20	>50	
Manufacturing sectors:			
Textiles, clothing, leather, footwear	19.07	16.91	17.49
Chemicals, rubber and plastics	9.40	11.90	10.81
Metals, mech./elect. eng., motors, vehicles	43.74	45.24	48.38
Food, timber, furniture, paper and other	27.79	25.95	23.32
Total	*100.00*	*100.00*	*100.00*
Geographical location:			
North-West	37.65	42.72	38.37
North-East	31.69	31.53	15.17
Centre	16.78	14.80	26.76
South and Islands	13.88	10.95	19.70
Total	*100.00*	*100.00*	*100.00*

(1) Italian firms with a size of more than 20 and more than 50 employees in 2002 (source ISTAT, 2005). (2) 12002 firm-year observations of our basic sample.

Table A1.2

THE POTENTIAL DETERMINANTS OF THE SHARE OF FAMILY FIRMS

name	definition	data by	weights to compute *F1* regional	provincial
capsoc	social capital index	province	0.163	0.166
turnout	election turnout	province	0.157	0.160
blood	blood donation	province	0.134	0.127
trust2	trust from World Value Survey, wave # 2	region	0.090	0.111
trust4	trust from World Value Survey, wave # 4	region	0.125	0.136
duration	length of ordinary civil proceedings	province	-0.139	-0.123
cost	administrative burdens on entry	region	-0.118	-0.134
time	time to obtain the permit to entry	region	-0.136	-0.133
gdp	percapita GDP in 2006	region	0.165	0.163

Appendix A2: Econometric issues

The econometric issue to be tackled is that of endogeneity coming from two potential sources: (a) panel-dynamics and (b) endogenous or predetermined other explanatory variables.

As far as dynamic is concerned, GMM estimators are typically used to obtain consistent parameter estimates in the context of dynamic single equations with panel data. However, GMM may be subject to large finite-sample biases when available instruments are weak (see e.g. Bond, 2002); this problem specifically occurs when data are highly persistent. Investigating the time series properties of the individual series of interest is therefore recommended. For this, Table A2.1 reports alternative estimates of the simple AR(1) specification for the main series in our model.[24]

Table A2.1

ALTERNATIVE AR(1) PARAMETER ESTIMATES FOR THE MAIN VARIABLES OF INTEREST [1]

Estimators (2):	OLS	FE	FD	GMMd	GMMs
Variables:					
investment plans	**0.4969**	**0.3277**	**-0.3196**	**0.3659**	**0.4686**
	0.0825	0.1337	0.0574	0.1042	0.0915
AC1 (3)	0.387		0.470	0.006	0.003
AC2 (3)	0.158		0.745	0.287	0.228
Hansen (4)				0.101	0.158
realized investments	**0.1898**	**-0.0272**	**-0.3981**	**-0.0149**	**0.1257**
	0.0271	0.0289	0.0360	0.0527	0.0668
AC1 (3)	0.367		0.594	0.002	0.000
AC2 (3)	0.144		0.003	0.434	0.291
Hansen (4)				0.380	0.185
expected sales	**0.9050**	**0.6352**	**0.0971**	**0.3959**	**0.4292**
	0.0168	0.0459	0.0656	0.1027	0.0884
AC1 (3)	0.080		0.946	0.011	0.002
AC2 (3)	0.965		0.439	0.319	0.316
Hansen (4)				0.596	0.502
uncertainty of future demand	**0.5887**	**0.3285**	**0.0182**	**0.2793**	**0.4253**
	0.0984	0.0281	0.1760	0.0935	0.0754
AC1 (3)	0.452		0.449	0.360	0.176
AC2 (3)	0.585		0.294	0.283	0.272
Hansen (4)				0.058	0.099

(1) Below the estimates (in bold), the corresponding heteroskedasticity-consistent standard errors. (2) OLS = pooled OLS; FE = OLS within; FD = first differenced OLS; GMMd = first differenced GMM, see Arellano-Bond (1991); GMMs = GMM system, see Blundell-Bond (1998). (3) AC*k* = p-values of the residual k^{th} order autocorrelation tests, see Arellano-Bond (1991). (4) P-values of the overidentifying restriction *J*-test, see Hansen (1982).

[24] All the estimates in this paper are performed using the Stata *xtabond2* procedure, see Roodman (2009).

Since all the four series are found to be not very persistent, difference GMM cannot be considered *a priori* affected by relevant downwards biases.

On the other side, extra moment conditions of system GMM can further lead the estimates to be biased towards OLS because of the overfitting problem and lack of identification; see e.g. Ziliak (1997). In this context, the comparison of the consistent GMM estimators to simpler estimators like OLS levels and within/first-differenced OLS, which are likely to supply biased in opposite directions the parameter of the lagged dependent variable in short T panels, can help in detecting these biases. For this, Table A2.2 reports alternative estimates of the general model (3) using the data for the panel of family firms used in the main text. Results using other samples are available upon request.

Table A2.2

ALTERNATIVE ESTIMATES FOR THE GENERAL MODEL PARAMETERS [(1)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
estimators [(2)]:	OLS	FE	FD	GMMd	GMMd3	GMMds	GMMs	GMMs3
α_1	**0.0028**	**0.0032**	**0.0227**	**0.0171**	**0.0164**	**0.0133**	**0.0047**	**0.0044**
	0.0013	0.0013	0.0067	0.0051	0.0049	0.0047	0.0026	0.0022
α_2	**-0.0616**	**-0.0633**	**-0.0341**	**-0.0488**	**-0.0487**	**-0.0538**	**-0.0889**	**-0.0870**
	0.0639	0.0547	0.0165	0.0188	0.0190	0.0228	0.0421	0.0363
α_3	**-0.1004**	**-0.1058**	**-0.0425**	**-0.3046**	**-0.3165**	**-0.3180**	**-0.3264**	**-0.3042**
	0.0762	0.0801	0.0601	0.1651	0.1699	0.1551	0.1452	0.1523
β_1	**0.5291**	**0.5048**	**-0.2624**	**0.4266**	**0.4323**	**0.4357**	**0.4967**	**0.5009**
	0.1016	0.1089	0.0372	0.1147	0.1142	0.1010	0.0968	0.0970
β_2 [(3)]	**0.0015**	**0.0019**	**-0.0105**	**-0.0002**	**0.0004**	**-0.0013**	**0.0087**	**0.0053**
	0.0027	0.0030	0.0168	0.0160	0.0158	0.0227	0.0088	0.0065
β_3	**-0.0173**	**-0.0192**	**0.0030**	**-0.0901**	**-0.1047**	**-0.1047**	**-0.1309**	**-0.0817**
	0.0349	0.0346	0.0462	0.1045	0.1048	0.1053	0.1080	0.1129
β_4	**0.0329**	**0.0330**	**0.0328**	**0.0368**	**0.0371**	**0.0355**	**0.0425**	**0.0428**
	0.0128	0.0128	0.0188	0.0249	0.0249	0.0254	0.0232	0.0218
N	835	835	613	613	613	835	835	835
Tbar	3.9	3.9	3.6	3.6	3.6	3.9	3.9	3.9
N×T	3336	3336	2228	2228	2228	3336	3336	3336
AC: [(4)]								
- 1st order	0.374		0.021	0.002	0.002	0.002	0.002	0.002
- 2nd order	0.168		0.954	0.273	0.269	0.285	0.257	0.228
Hansen [(5)]				0.626	0.611	0.632	0.357	0.299
Diff-test [(6)]						0.234	0.003	0.015

([1]) Equation (3) estimates using the sample of the family-firms. Below the alternative estimates (in bold) there are the heteroschedasticity-consistent standard errors. ([2]) OLS = pooled OLS; FE = OLS within; FD = first differenced OLS; GMMd = first differenced GMM (lags from t-2); GMMd3 = first differenced GMM (lags from t-3); GMMds = first differenced GMM and also GMM-levels for sales only (lags from t-2); GMMs = GMM system (lags from t-2); GMMs3 = GMM system (lags from t-3). ([3]) Being the explanatory measured in millions, estimates must be divided by 10^6. ([4]) AC = p-values of the residual autocorrelation tests, see Arellano and Bond (1991). ([5]) P-values of the overidentifying restriction *J*-test, see Hansen (1982). ([6]) Test for the extra moment conditions exploiting levels.

Results are quite clear-cut. The estimates in the first three columns are biased by the omission of significant individual effects (OLS) and the endogeneity of at least the lagged dependent variable. In this context, as discussed in Bond (2002), the β_1 OLS estimate is upwards biased while the FD one is underestimated. In the columns (4)-(6) the first differenced GMM estimates do not reject neither the second order autocorrelation nor the overidentification hypotheses, in addition the estimate of the lagged dependent variable parameter always falls inside the OLS/FD range of opposite-sign bias. In the last two columns, the GMM system estimates reject the overidentification test for the incremental moment conditions in levels and, in general, show estimates qualitatively similar to those of (biased) OLS probably because overfitting.

Despite we consider the difference GMM estimates more reliable than the others, it is worth noting the robustness of the finding about the significantly negative effect of uncertainty on investment plans.

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