Performing Youth:
Did Young Managers Withstand the Great Recession?

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Abstract

In this paper we analyze if firms' performance is related to the age of the CEO. In particular we examine how far firms managed by young CEOs (less than 45 years old) have been able to better withstand the financial crisis between 2009 and 2014 than those managed by middle aged and senior individuals. Our empirical analysis is conducted on a representative sample of around 10,000 firms with more than 10 employees in seven European countries. Our data are derived from the merging of Bureau Van Dijk's Amadeus with the EU EFIGE/Bruegel-Unicredit (EFIGE) survey. Once we control for a large set of firm characteristics in the pre-crisis period (firm size, firm age, past growth rate, financial conditions, innovation propensity and internationalization status, governance and demand factors) plus country and industry unobserved heterogeneity, preliminary results show that firms managed by younger CEOs have performed better, on average, than their counterparts during the Great Recession.

Keywords: CEO age, firm growth, Great Recession, quantile regression

JEL codes: C21, D22, G30, L26, L60, O47

Introduction

There is a large heterogeneity in the age of the CEOs managing European companies. Most of them are between 35 and 55 years old, but the share of both younger and older managers is considerable. There is also much heterogeneity across European countries. In our data, 52% of Italian companies are run by individuals older than 55, accounting for more than 60% of total turnover. In Germany these shares are 37% and 45% respectively.

What is the impact of the age of the CEO on growth? And have firms with younger CEOs been able to better withstand the Great Recession? Is the rather considerable senility of the population of managers an impediment to firms' growth?

These are critical questions. Among other characteristics, the age of the manager is a critical strategic choice that firms make. Age affects considerably the way in which firms can be managed, with a trade off between propensity to risk and experience. Especially in periods of high uncertainty and negative cycle, firms are obliged to make extensive changes and adapt to ever changing market conditions. Is the ability to adapt to change that young people have to higher degree than older one a useful ingredient in these frameworks? Or, rather, are a pair of safe hands and long standing experience more valuable?

This paper addresses this issue, carrying out an empirical analysis based on a sample of 10,000 European firms observed along a period of 14 years, between 2001 and 2014. The data set is constructed through the merger of the Efige survey data (which provides information on the age of the entrepreneur in 2009, at the start of the crisis, along with other firm specific characteristics, and the Bureau Van Dijk's Amadeus data set that provides a panel of balance sheet and employment data between 2001 and 2014.

Preliminary analysis reported in this draft shows indeed that firms managed by CEOs of less than 45 years of age have been able to grow more (or decline less) than firms managed by older CEOs. These findings are robust to OLS and quintile estimations and also to a wide range of controls, concerning other firms'characteristics and past growth performance.

The fact that mangers are not assigned randomly to firms raises clearly a set of endogeneity issues. The possible impact of unobservables is minimised through the inclusion of large batteries of controls as well as industry and time fixed effects. The possible inverse relationship between frims'growth and the choice of managers is for the moment addressed by the inclusion of past growth rates in our estimations. The final version of this paper will develop a more articulate identification strategy, possibly with the inclusion of instrumental variables.

Several earlier contributions have looked at the relationship between the characteristics of managers and firms' performance, see for example Flabbi et al. 2016 or Bertrand and Schoar 2003.

Many others have looked at the relationship between the age of the firm and performance (Arrighetti et al. ,2016, Fort et al. ,2013, but ours is the first attempt to relate the age of the CEO and performance.

In what follows we first discuss the existing literature and motivate our paper accordingly. We then discuss our data and our empirical strategy and results. The final section concludes.

Background

What is the relationship between the age of the Chief Executive Officer (CEO) and firm growth, and why should companies led by younger top managers perform better, especially during a period of recession?

As for the first question, several motivations can be put forward. These are mainly related to the long time horizon of the career of a young CEO. If firm growth is an important component of compensation, as suggested by Yim (2013, p. 252), an expansion in size may result in a longer future stream of compensation benefits. This provides an incentive for CEOs to pursue that expansion early in their career.

The time horizon of the career is also related to risk aversion. There is evidence on the positive relationship between risk-aversion and individual age at work in a representative sample of 80,000 individuals from 76 countries (Falk et al., 2015, p. 21). Risky strategies imply higher probabilities of financial/economic distress for the firm, with a consequent high probability for the CEO to be fired; once fired, older CEOs may find it more difficult to be hired in other firms. Their bottom line is lower than for younger managers.[1] Second, older CEOs may choose not to pursue risky long term investments, because they would probably divert funds from current profitability and they would not probably benefit from the long-payback times of such strategies (Barker and Mueller, p. 785).

Along the same vain, Serra et al. (2012, pp. 212; 217) have found younger CEOs to be associated with higher export propensity in a sample of UK textile firms. Besides for a lower risk aversion, young CEOs may be internationally minded, react more to *stimuli* and have more energy (which is required for exporting activity).

The fact that young CEO are more willing to take larger risks than older ones, is also reflected in the structure of their compensation packages. Adhikari et al. (2015, pp. 201-2013) find that younger CEOs are more likely to be paid *via* performance based compensations (such as annual restricted stock grants and Long-Term-Incentive-Plan payouts), while older CEOs may prefer cash compensation in lieu of stock based compensation, due to their shorter employment horizon.

[1] Actually, it should be considered that younger CEOs' termination may be more sensitive to firm performance with respect to their older counterparts, as suggested by Yim (2013, p. 252), if this is due to the initially noisy assessment of younger managers' ability.

The likely different attitude of young CEOs are especially important in phases of rapid and extensive recession when firm strategies must be revised radically and fast. This of course contrast with an opposite hypothesis that, especially during crises, you need a pair of safe hands, i.e. experienced managers. The evidence available on the relationship between firms characteristics and their performance during the crisis are in contrast with the hypothesis that young CEOs might have been more effective than their older counterparts during the crisis.

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Arrighetti et al. (2016), by using a sample of 5,051 Italian manufacturing firms, show that firms which have grown the most during the period 2007-2012 showed higher exports-to-sales and R&D expenditures-to-sales ratios. If these characteristics, as also suggested previously in this paragraph, are negatively correlated to the CEO's age, this may explain a superior performance of businesses managed by younger CEOs during the crisis.

Another relevant factor which has been put forward for explaining heterogeneity in firm performance during the Great Recession, and which may also well be related to CEOs' age is firm age. Young firms are more likely to be managed by young CEOs. Here the evidence is ambiguous. Indeed, Arrighetti et al. (2016) find that old firms are less likely to experience fast growth rates during the Great Recession. Yet in a broader framework, but rather consistently, with these findings, Fort et al. (2013 pp. 530-534) show that even if young/small U.S. manufacturing firms show higher net job creation rates than their older counterparts, in the overall period 1980-2010, the differential in the net job creation rates fell substantially during period 2007-2010. Equally, Bartz and Winkler (2016) find that in 2009 (deepest contraction for the German economy) younger firms perform worse than their older counterparts do, while in a period of expansion the opposite is true.

Overall, it is relevant to control for these firm characteristics in order to see if there exist a *per se* CEO age "effect" on firm growth.

Naturally our analysis suffers of serious endogeneity problems at this stage. The age of the CEO is a choice variable. Firms select their CEOs, based on their own characteristics and strategies (Kaplan et al. 2012). Thus fast growing firms may choose young CEOs. As suggested by Joos et al. (2003), firms consider the following general characteristics when evaluating CEO candidates: effort, risk tolerance, horizon and human capital. Younger CEOs are less effort-averse (thus they need lower compensation for their effort) and risk-averse, but they possess less general firm- and industry-specific human capital. Consequently, firms requiring more effort and riskier businesses will gravitate towards younger CEOs and that is the case of start-ups, high-growth firms and firms in financial distress. Conversely, large and stable firms may prefer more experienced, senior CEOs.

Data and descriptive results

We exploit an original database that was recovered by merging Bureau Van Dijk's Amadeus database with the European Firms in a Global Economy (EFIGE) survey. Amadeus contains economic and financial information on European companies in the period from 2001 to 2014. This information has been used to build the measure of average firm growth during the last economic crisis (2009-2014) in terms of growth of operating revenues, which is the dependent variable in the econometric exercise. Moreover, the information contained in Amadeus has been used to build a set of economic and financial variables included as controls in the regressions. In particular, a measure of firm size (average 2001-2008), firm growth (average growth rate 2001-2008) and debt-assets ratio (average 2001-2008) have been included to account for firms' characteristics in the pre-crisis period.

The EFIGE survey was conducted on a sample of manufacturing firms with more than 10 employees in seven European countries (Italy, France, Spain, United Kingdom, Germany, Hungary and Austria) in 2009. The survey contains the fundamental information regarding the age of the CEO as a categorical variable (5 categories of age). Moreover, the survey has been used to calculate firm age on the base of year of establishment and several qualitative characteristics: the propensity to introduce product and process innovations; the number of countries to which a firm exports and the fact that the it is/isn't an importer and that it has/hasn't foreign affiliates; the fact that it is either directly or indirectly controlled by an individual or a family-owned entity; the gender of the CEO; the fact that the firm se prices as margin over total or variable costs (price-maker); features of the demand faced by the firm, i.e. if the firm has perceived a lack in demand as the main factor preventing its growth, if the firm has gone through any form of quality certification during 2009 and, finally, if the firm has widened the range of products offered to its clients in 2009.

In Table 1 and Table 2 we show that firms managed by younger CEOs (less than 45 years old) are relatively rare. They represent overall 24% of all firms in the sample and 18% of 2013 turnover. It is also clear that there are some differences across countries, with the extreme cases of Hungary, where firms with young CEO account for almost 50% of turnover, and Italy, where the same type of firms account for about 8% of turnover.

The age of the CEO seems to correlate quite well with firm growth. Table 3 shows that during the relative expansion phase (2001-2008) the turnover of firms managed by younger CEO grew on average between 8% and 9.7%, which is more than 2.5 times the growth rate of firms managed by CEOs older than 65. Differences are smaller if taken at median, as the growth rate of firms managed by younger CEOs is much more skewed, suggesting that there are more episodes of very high growth among these firms. If we control for sectoral and country characteristics, by considering deviations in growth from the sectoral (2-digit) and country mean, differences are even more pronounced. This

pattern is somewhat confirmed when we consider the recession period. Not surprisingly, during this period growth is on average negative, but firms managed by younger CEOs had an average growth around -4%, while those managed by older CEO experience an average growth of -6.7%.

A closer look at the distribution of the growth rates, reveals that a key difference is on the tails. In particular, Figure 1 show that firms with younger CEOs (the solid line in lighter colour) are more likely to exhibit very high growth rates, while the firms with older CEOs (dashed line in lighter colours) are much less likely to achieve very high growth. This suggests that in order to better explain this phenomenon, we need to look at different quantiles of growth. We will do it first by producing descriptive statistics at selected percentiles of firm growth, and then by running a fully-fledged quantile regression.

Table 4 provides descriptive statistics on a number of firm characteristics that will be later used in the econometric analysis. Results are presented for subset of firms grouped according to the percentile of post-crisis turnover growth they fall into. We identify firms up to the 5^{th} percentile, between 5^{th} and 25^{th}, 25^{th} to median, up to 75^{th}, 95^{th} or above. Interestingly, there is a subset of firms that grew quite significantly even during the crisis. The fastest-growing firms reached an average growth of 12.8%. This bears the question: who are these firms? Somewhat surprisingly, larger firms in the pre-crisis period are growing faster during the 2009-2014 period, and firms that grew faster before the crisis keep growing, although this is by no means a linear relation, since there is also some evidence that in the group of the shrinking firms in 2009-2014 the growth rate 2001-2008 was quite high. A similar pattern emerges also in relation to firm age. Younger firms are at both ends of the distribution: they tend to either growth very fast, or shrink significantly. Consistently with our evidence above, we can appreciate that firms with young CEOs (35-44 years old) are significantly more frequent among the fast-growing firms. At the other extreme, firms managed by the more senior CEOs (65 or more) are less frequent among the fast-growing firms and much more likely among the shrinking firms. Among the other firm characteristics positively associated with firm growth, it is worth highlighting product and process innovation, product certification and a wider product range. Some characteristics seem to be associated more strongly with negative growth performance. For example, family firms (i.e. those which are either directly or indirectly controlled by an individual or a family-owned entity) or firms with a female CEO seems to be more frequent in the group of the fast shrinking firms. Internationalisation is not clearly associated with firm growth, but firms which export is more than 30 markets tend to perform better.

Econometric analysis and results

A step further in our analysis is to ascertain whether the positive association between firm growth and the age profile of the CEO is not a figment of a potential correlation of the latter with a number of firm characteristics. The richness of the EFIGE survey allows us to control for a wide range of possible confounders and thus deliver a robust correlation between age of the CEO and firm growth.

We employ two different models to test the relationship between age of the CEO and firm growth. We start by running an average OLS regression of the form:

$$\overline{gr}_{i,2009-2014} = \alpha + \beta' CEO\ AGE^{p}_{i,2009} + +\gamma' \bar{Z}_{i,2001-2008} + \delta' W_{i,2009} + \mu_j + \gamma_c + \varepsilon_{i,2009-2014} \qquad (1).$$

$\overline{gr}_{i,2009-2014}$ is the average growth rates of the i^{th} firm during the period 2009-2014; $CEO\ AGE^{p}_{i,2009}$ stands for the category (five categories, $p = \{1,2,3,4,5\}$) of age of the CEO the i^{th} firm is managed by, as it is measured in the EFIGE survey in year 2009; $\bar{Z}_{i,2001-2008}$ is a vector of firms' characteristics (size, age, growth rate, debts-asset ratio) calculated as averages over 2001-2008 period; $W_{i,2008}$ is a vector of time-invariant variables observed at the beginning of the period (years 2007, 2008 and 2009, depending on the variable), which have been built from the information contained in the EFIGE survey (introduction of product and process innovations; the number of countries to which a firm exports and the fact that the it is/isn't an importer and that it has/hasn't foreign affiliates; a dummy for family firms; the gender of the CEO; the fact that the firm is "price-maker"; a dummy indicating if the firm has perceived a lack in demand as the main factor preventing its growth; a dummy indicating if the firm has gone through any form of quality certification; a dummy indicating if the firm has widened the range of products offered to its clients). μ_j is a vector of sectoral fixed effects which are included in order to control for all time-invariant sector characteristics and a vector γ_c of country fixed effects in order to control for country-specific time invariant factors.

The results of the OLS regressions establish the conditional correlation between the age of CEO and average firm growth. Results from an OLS regression of the average growth rate of firm turnover in the post-recession period (2009-2014) are presented in Table 5. The baseline regression includes only country and industry fixed effects and four dummies identifying firms according to age group of their CEO. The excluded category are firms with CEOs aged 65 or more. This specification exploit the information on all firms in our sample, ensuring maximum variability across countries and sectors. As we add control variables, we face problems with missing values that reduce the number of available observations, also inducing some sample selection issues, as for some variables the number of missing variables is higher in some countries. Reassuringly, as we will show shortly, our main results are not sensitive to this.

In the baseline estimation, it emerges quite clearly that the firms managed by very senior CEOs tend to grow less. At other extreme, we can see how firms managed by relatively young CEOs (between 35 and 44 years old) have a higher average growth. The very young CEOs do not perform as well as their older cohorts but, as we have shown in Table 1, these are also a handful of firms. When we add pre-crisis firm growth, as well as firm age, size, and debt/assets ratio, we notice a 10% drop in the number of observations (from 10,661 to 9,562) but results are largely confirmed. The magnitude of the growth premium for young CEOs drops to 2.5%, but it still remains very significant. It is worth mentioning that in column 1 we control for past growth, which means that we also control for the fact that firms with younger CEOs may perform better also before the crisis. In columns 2-8 we add further controls including innovation, internationalisation, governance, product quality, but the conditional correlation between young CEOs and higher firm growth is unscathed. A closer look at the control variables reveals that firm growth is positively associated with process innovation, product quality and innovation, the ability of the firms to be a price maker. As already evidenced in Table 4 internationalisation is not significantly associated with growth, but firms which export is more than 30 markets tend to perform much better. A negative association with growth emerges with debt/asset ratio, suggesting that highly indebted firms are likely to grow less, family control and lack of demand. Both the gender of the CEO and the fact the company has recently acquired/incorporated other firms do not correlate with firm growth.

Until now, we have tried to partially control for the likely sorting of CEOs by heterogeneous firms by including in the analysis the past (2001-2008) firm characteristics that should be correlated with CEO age in 2009 (i.e. they should lead firms to select CEOs with different ages, on the base of their own strategies and characteristics).

Nonetheless, the information on whether the firm has been recently acquired/incorporated by other firms provides a possible further identification strategy to correct for the potential endogeneity the choice of young managers. If we assume that post acquisition the CEO is likely to change, by interacting the acquisition dummy with the CEO age dummies, we can get a sense of whether having appointing younger CEOs after an acquisition contributes to boosting firm growth. Results, presented in column 9 of Table 5 suggest that if after an acquisition appoint a very senior CEO, they are more likely to grow less.

The discussion of descriptive statistics and the analysis of the literature suggested that younger CEOs may not necessarily bring more growth across the board. Rather, it may be associated with a

fatter right tail of the growth rate distribution. In order to test this, we estimate a quantile regression based on specification 8 of Table 5.[2]

The quantile regression model allows estimating the coefficients of the regressor of interest at various quantiles of the conditional distribution of the dependent variable. In particular, in the case of the present analysis, the quantile regression model can be specified as:

$$\overline{gr}_{i,2009-2014} = \alpha_\theta + \beta'_\theta CEO\ AGE^p_{i,2008} + \gamma'_\theta \bar{Z}_{i,2001-2008} + \delta'_\theta W_{i,2008} + \mu_{\theta j} + \gamma_{\theta c} + \varepsilon_{\theta i,2009-2014}. \quad (2)$$

After defining $X_{i,t(2008;2001-2008)} = [CEO\ AGE^p_{i,2008}, \bar{Z}_{i,2001-2008}, W_{i,2008}, CONTRY_c, SECTOR_j]$ and $\vartheta'_\theta = [\beta'_\theta, \gamma'_\theta, \delta'_\theta, \eta_{\theta j}, \gamma_{\theta c}]$, the quantile regression estimator (Koenker and Basset, 1978) is the vector of parameters ϑ which solves the following operation:

$$\min_{\vartheta} \frac{1}{n} \left\{ \sum_{i,t:\overline{gr}_{i,2009-2014} \geq \vartheta' X_{i,t(2008;2001-2008)}} \theta \left| \overline{gr}_{i,2009-2014} - \vartheta' X_{i,t(2008;2001-2008)} \right| + \sum_{i,t:\overline{gr}_{i,2009-2014} < \vartheta' X_{i,t(2008;2001-2008)}} (1-\theta) \left| \overline{gr}_{i,2009-2014} - \vartheta' X_{i,t(2008;2001-2008)} \right| \right\}. \quad (3)$$

Results are presented in Table 6 and confirm that firms managed by younger CEOs grow faster and this is particularly significant for the right tail of the distribution. Indeed, from the 50th percentile onwards (which roughly correspond to positive growth rates) firms with CEOs younger than 45 years old grow faster than firms managed by older CEOs, and the premium increases in higher percentiles. The quantile regression also allow to unveil interesting effects of other variables. In particular, firm size and age are significantly negatively correlated with fast growth, so it is more likely to find fast growing firms among smaller and younger firms, *ceteris paribus*. Also, it seems that male CEOs are associated with firm fast growth. Other results are broadly in line with OLS estimates. Overall, our results suggest that our model is better able to characterise fast-growing firms, while very few variables seem to explain why firms shrink.

[2] Specification 8 includes a wide range of key firm characteristics affecting firm growth. We exclude the lack of demand, since this variable has a significant number of missing values.

Conclusions

This paper provides some robust evidence on (i) the negative relation between CEO age and firm growth and (ii) the better performance of firms managed by younger CEOs with respect to their counterparts during the Great Recession. It emerges clearly from OLS regressions that the firms managed by very old CEOs tend to grow less during the 2009-2014 period, while firms managed by relatively young CEOs (between 35 and 44 years old) have a higher average growth over the same period of time. The result is robust to the inclusion of a long vector of firm characteristics in the pre-crisis (2001-2008) period, industry and country unobserved heterogeneity. The use of quantile regressions allow us to explore if the negative relation between CEO age and firm growth is driven by extreme episodes of growth and shrink. Indeed, from the 50^{th} percentile onwards (which roughly correspond to the part of the distribution associated to positive growth rates) firms with CEOs younger than 45 years old grow faster than firms managed by older CEOs while no significant differences emerge across categories of CEO age in the case of shrinking firms.

We recognise that a process of selection of CEO of different ages by heterogeneous firms may be at work, pointing to a reverse causation in the relationship between firm growth and CEO age (from firm characteristics to the choice of the CEO whose traits –age—match better with the firm). We partially take into account this issue by including in the econometric models a long vector of firm characteristics observed before the average growth rate in the 2009-2014 period. If contemporaneous and previous firm characteristics (measured either in 2008, 2009 or over the 2001-2008 period, depending on the variable) are correlated to the age of the CEO in 2009, this should partially limit the selection issue. Moreover, another attempt to correct for the potential endogeneity the choice of young managers is the use of the information on whether the firm has been recently acquired/incorporated by other firms. If we assume that post acquisition the CEO is likely to change, by interacting the acquisition dummy with the CEO age dummies, we can get a sense of whether having appointing younger CEOs after an acquisition contributes to boosting firm growth. Results suggest that if after an acquisition appoint a very senior CEO, they are more likely to grow less.

Tables and Figures

Table 1 - Distribution of sample firms by age of the CEO and country

	Austria	France	Germany	Hungary	Italy	Spain	UK	Total
Very young CEO (<=34 y.o.) (dummy)	4,16%	3,03%	2,54%	4,30%	2,52%	4,56%	2,14%	3,07%
Young CEO (35-44 y.o.) (dummy)	22,66%	22,79%	20,47%	21,11%	16,35%	26,62%	16,74%	20,83%
Middle-aged CEO (45-54 y.o.) (dummy)	41,37%	40,24%	39,04%	34,43%	28,83%	33,44%	37,99%	35,91%
Senior CEO (55-64 y.o.) (dummy)	26,20%	29,26%	28,82%	32,79%	30,82%	28,60%	31,05%	29,63%
Very old CEO (>=65 y.o.) (dummy)	5,61%	4,68%	9,13%	7,38%	21,48%	6,78%	12,08%	10,55%
Total	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
N. Firms	481	2970	2956	488	3021	2832	2103	14851

Table 2 - Distribution of 2013 turnover by age of the CEO and country

	Austria	France	Germany	Hungary	Italy	Spain	UK	Total
Very young CEO (<=34 y.o.)	14.09%	0.88%	0.86%	0.56%	0.76%	1,20%	1.15%	1.47%
Young CEO (35-44 y.o.)	5.34%	12.62%	23.56%	48.04%	7.47%	20,39%	11.69%	16.78%
Middle-aged CEO (45-54 y.o.)	66.86%	42.29%	30.08%	29.84%	31.44%	43,79%	36.17%	35.68%
Senior CEO (55-64 y.o.)	12.20%	42.14%	39.02%	13.71%	42.90%	23,99%	47.92%	35.23%
Very old CEO (>=65 y.o.)	1.50%	2.07%	6.49%	7.84%	17.43%	10,63%	3.07%	10.86%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 3 - Turnover growth rate pre and post crisis (2001-2008 and 2009-2014) by age of the CEO

	Absolute growth rate				Deviation from sectoral (2-digit)-country mean growth		
2001-2008	mean	median	skeweness		mean	median	skeweness
<=34 y.o	0.097	0.063	3.228		0.047	0.010	2.943
35-44 y.o.	0.080	0.051	4.919		0.036	0.006	4.338
45-54 y.o.	0.064	0.041	4.873		0.024	-0.001	3.854
55-64 y.o.	0.053	0.039	1.652		0.014	-0.005	1.620
>=65 y.o.	0.036	0.032	-1.055		0.008	-0.002	-0.678
Total	0.062	0.042	3.387		0.022	-0.001	2.936
2009-2014	mean	median	skeweness		mean	median	skeweness
<=34 y.o	-0.048	0.000	-3.612		-0.018	0.012	-3.706
35-44 y.o.	-0.039	0.000	-3.690		-0.012	0.011	-3.635
45-54 y.o.	-0.040	0.000	-5.984		-0.018	0.008	-5.856
55-64 y.o.	-0.046	0.000	-4.646		-0.020	0.007	-4.845
>=65 y.o.	-0.067	-0.008	-9.456		-0.035	0.006	-9.560
Total	-0.045	0.000	-5.675		-0.019	0.009	-5.724

Table 4 - Descriptive statistics at different percentiles of the 2009-2014 average operating revenues growth rate distribution

Variable	5 pct	25 pct	50 pct	75 pct	95 pct
average gr (2009-2014)	-0.4359	-0.0798	-0.0109	0.0358	0.1284
average operating revenues (2001-2008)	2532.50	2733.37	3722.55	4347.25	4203.63
average gr (2001-2008)	0.0611	0.0306	0.0416	0.0428	0.0945
average age (2001-2008)	19	20.5	27.5	21.5	19.5
average debt/assets ratio (2001-2008)	0.7885	0.6678	0.6423	0.6562	0.6869
Very young CEO (<=34 y.o.) (dummy)	3.54%	1.77%	3.54%	0.00%	0.89%
Young CEO (35-44 y.o.) (dummy)	19.47%	13.27%	18.58%	21.24%	26.79%
Middle-aged CEO (45-54 y.o.) (dummy)	38.94%	33.63%	38.94%	34.51%	37.50%
Senior CEO (55-64 y.o.) (dummy)	26.55%	39.82%	30.97%	33.63%	27.68%
Very old CEO (>=65 y.o.) (dummy)	11.50%	11.50%	7.96%	10.62%	7.14%
product innovation (dummy)	44.25%	47.79%	49.56%	55.75%	55.75%
process innovation (dummy)	49.56%	35.40%	42.48%	46.90%	53.98%
0 countries to which the firm exports (dummy)	42.45%	40.91%	33.33%	36.11%	43.27%
1-5 countries to which the firm exports (dummy)	30.19%	34.55%	27.78%	25.93%	22.12%
6-30 countries to which the firm exports (dummy)	25.47%	20.91%	31.48%	32.41%	25.96%
>=31 countries to which the firm exports (dummy)	1.89%	3.64%	7.41%	5.56%	8.65%
importer (dummy)	41.59%	37.17%	52.21%	38.94%	49.56%
foreign affiliates (dummy)	7.08%	4.42%	10.62%	7.08%	9.73%
family firm (dummy)	75.89%	73.45%	61.06%	66.37%	64.60%
male CEO (dummy)	89.38%	92.92%	92.92%	92.04%	91.96%
Price maker (dummy)	53.10%	60.18%	58.93%	59.82%	46.85%
voluntary quality certification (dummy)	34.82%	30.97%	34.23%	36.04%	37.84%
product range widened (dummy)	43.36%	43.36%	48.67%	49.56%	58.41%
demand lack (dummy)	51.85%	56.25%	48.94%	38.38%	26.60%

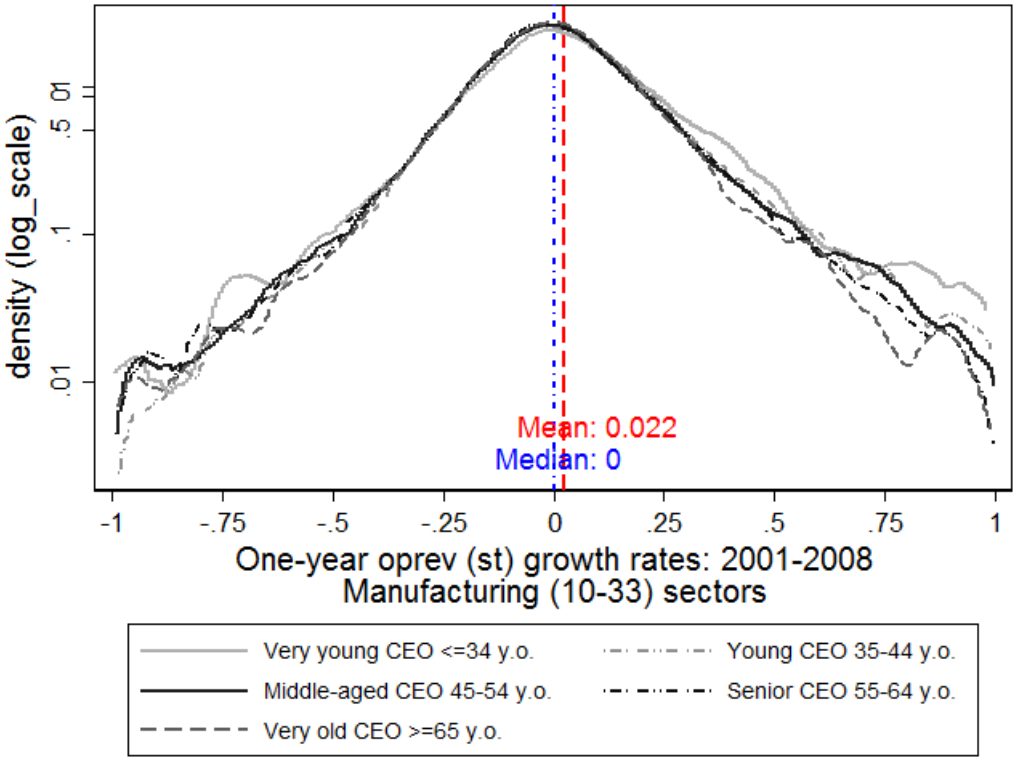
Table 5 – OLS regressions of the average growth of sales in the period 2009-2014

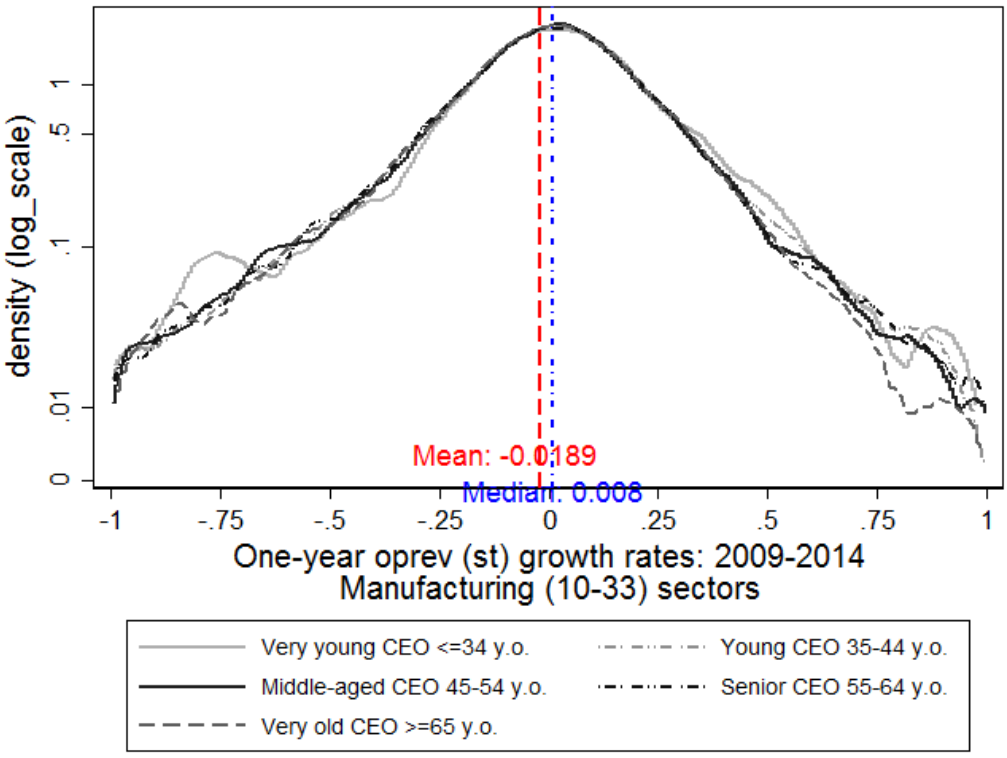
	Baseline	1	2	3	4	5	6	7	8	9	
Dependent variable: operating revenues (non-standardized measure)										Main effects	*Interaction with being acquired*
Very young CEO (<=34 y.o.)	0.027*	0.019	0.017	0.016	0.017	0.017	0.017	0.016	0.022	0.021	*0.113*
Young CEO (35-44 y.o.)	0.033***	0.025***	0.024**	0.023**	0.023**	0.023**	0.023**	0.023**	0.026**	0.022**	*0.176***
Middle-aged CEO (45-54 y.o.)	0.021**	0.014*	0.014	0.015*	0.014	0.014	0.014	0.014	0.014	0.012	*0.153***
Senior CEO (55-64 y.o.)	0.024***	0.016*	0.015*	0.014	0.013	0.014	0.014	0.013	0.019*	0.015	*0.184****
Sales (2001-2008) average		0.001	-0.000	-0.003	-0.004*	-0.004*	-0.004*	-0.005*	-0.005*	-0.004	
Age (2001-2008) average		-0.004	-0.004	-0.005*	-0.004	-0.004	-0.004	-0.004	-0.005	-0.003	
Sales growth rate (2001-2008)		0.004	0.002	-0.002	-0.003	-0.003	-0.003	-0.005	-0.002	-0.005	
Debt/Asset ratio (2001-2008)		-0.025***	-0.025***	-0.027***	-0.026***	-0.027***	-0.027***	-0.028***	-0.024***	-0.024***	
Product innovation			0.012**	0.010*	0.011*	0.011*	0.011*	0.006	0.009	0.008	
Process innovation			0.016***	0.016***	0.017***	0.017***	0.017***	0.015***	0.010*	0.010*	
1-5 countries to which exported				-0.003	-0.003	-0.003	-0.003	-0.005	-0.010	-0.010	
6-30 countries to which exported				0.008	0.008	0.008	0.008	0.005	-0.001	-0.001	
>=31 countries to which exported				0.032**	0.033**	0.033**	0.033**	0.032**	0.012	0.011	
Importer				0.004	0.004	0.004	0.004	0.003	0.001	0.000	
Foreign affiliates				0.018	0.018*	0.016	0.016	0.017	0.016	0.015	
Family Firm					-0.013**	-0.013**	-0.013**	-0.014**	-0.012*	-0.012*	
Male CEO					0.006	0.006	0.006	0.006	-0.002	-0.002	
The firm has acquired/incorporated other firms						0.007	0.007	0.006	-0.002	-0.002	
The firm has been acquired/incorporated by other firms							-0.004	-0.005	-0.005	-0.162***	
Price maker								0.012**	0.014**	0.014**	
Voluntary Quality Certificate								0.016***	0.019***	0.018***	
Product Range Widened								0.014**	0.019***	0.019***	
Demand Lack									-0.025***	-0.025***	
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Log likelihood	-438	122	132	75	73	73	73	36	75	79	
N. firms	10661	9562	9561	9085	9071	9070	9070	8934	7090	7090	

Table 6 – Quantile regressions of the average growth of sales in the period 2009-2014

Dependent variable: operating revenues (non-standardized measure)	5 pct	25 pct	50 pct	75 pct	95 pct
Very young CEO (<=34 y.o.)	0.012	0.005	0.011*	0.017**	0.025*
Young CEO (35-44 y.o.)	0.026	0.001	0.007**	0.013***	0.026***
Middle-aged CEO (45-54 y.o.)	0.003	0.003	0.003	0.007**	0.011*
Senior CEO (55-64 y.o.)	0.015	0.002	0.000	0.006*	0.016**
Sales (2001-2008) average	-0.003	-0.003*	-0.003***	-0.005***	-0.008***
Age (2001-2008) average	0.016	0.001	-0.004***	-0.007***	-0.016***
Sales growth rate (2001-2008) average	0.022	0.003	0.013	0.023***	0.008
Debt/Asset ratio (2001-2008) average	-0.073***	-0.026***	-0.006**	-0.001	0.005
Product innovation	0.038*	-0.004	-0.003	0.000	0.002
Process innovation	0.014	0.012***	0.009***	0.009***	0.011**
1-5 countries to which exported	-0.028	-0.001	0.002	0.007***	0.012*
6-30 countries to which exported	0.018	0.011**	0.011***	0.012***	0.021***
>=31 countries to which exported	0.038	0.022***	0.021***	0.016***	0.016
Importer	-0.010	0.005	0.004*	0.005**	0.002
Foreign affiliates	0.013	0.001	0.003	-0.001	0.008
Family Firm	-0.035*	-0.009**	-0.005**	-0.002	-0.012**
Male CEO	0.001	0.008	0.009***	0.010***	0.026***
The firm has acquired/incorporated other firms	0.014	0.006	0.004	0.005	0.010
The firm has been acquired/incorporated by other firms	-0.051	-0.017	0.001	0.027***	0.060***
Price maker	0.011	0.001	-0.001	-0.004	-0.003
Voluntary Quality Certificate	0.016	0.007**	0.006***	0.004*	0.014***
Product Range Widened	0.017	0.011***	0.009***	0.008***	0.004
Constant	-1.193	-0.306	0.008	0.074***	0.207
N. firms	8934	8934	8934	8934	8934

Figure 1 - Distribution of turnover growth (deviations from country-sector mean), by age of CEO and period (2001-2008; 2009-2014)





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Appendix

Table A.1. - Definition of variables

Variable	Definition
average gr (2009-2014)	Average growth rate of the operating revenues during the 2009-2014 period
average operating revenues (2001-2008)	Average firm size in the 2001-2008 (pre-crisis) period
average gr (2001-2008)	Average growth rate of the operating revenues during the 2001-2008 (pre-crisis) period
average age (2001-2008)	Average firm age in the 2001-2008 (pre-crisis) period
average debt/assets ratio (2001-2008)	Ratio of total debts over total assets in the 2001-2008 (pre-crisis) period
Very young CEO (<=34 y.o.) (dummy)	Dummy taking value equal to 1 when the CEO is younger than 35 y.o. in 2009
Young CEO (35-44 y.o.) (dummy)	Dummy taking value equal to 1 when the CEO is 35-44 y.o. in 2009
Middle-aged CEO (45-54 y.o.) (dummy)	Dummy taking value equal to 1 when the CEO is 45-54 y.o. in 2009
Senior CEO (55-64 y.o.) (dummy)	Dummy taking value equal to 1 when the CEO is 55-64 y.o. in 2009
Very old CEO (>=65 y.o.) (dummy)	Dummy taking value equal to 1 when the CEO is older than 64 y.o. in 2009
product innovation (dummy)	Dummy taking value equal to 1 if the firm has introduced in the period 2007-2009 any product innovation
process innovation (dummy)	Dummy taking value equal to 1 if the firm has introduced in the period 2007-2009 any process innovation
0 countries to which the firm exports (dummy)	Dummy taking value equal to 1 if the firm doesn't export to any country in 2008
1-5 countries to which the firm exports (dummy)	Dummy taking value equal to 1 if the firm exports to a no. of countries between 1 and 5 in 2008
6-30 countries to which the firm exports (dummy)	Dummy taking value equal to 1 if the firm exports to a no. of countries between 6 and 30 in 2008
>=31 countries to which the firm exports (dummy)	Dummy taking value equal to 1 if the firm exports to a no. of countries higher than 30 in 2008
importer (dummy)	Dummy taking value equal to 1 if the firm has purchased services, raw materials and/or intermediate goods in 2008
foreign affiliates (dummy)	Dummy taking value equal to 1 if the firm has any affiliate (i.e. firms of which it owns a share of at least 10%) in a foreign country in 2009
family firm (dummy)	Dummy taking value equal to 1 if the firm is directly or indirectly controlled by an individual or family-owned entity in 2009
male CEO (dummy)	Dummy taking value equal to 1 if the current CEO/ Company Head is male in 2009
Price maker (dummy)	Dummy taking value equal to 1 if the firm sets in 2009 its prices in the domestic market either as a margin over total costs or a margin over variable costs
voluntary quality certification (dummy)	Dummy taking value equal to 1 if the firm has gone through any form of quality certification during 2009 for products and/or processes
product range widened (dummy)	Dummy taking value equal to 1 if during 2009 the product range offered by the firm has been widened
demand lack (dummy)	Dummy taking value equal to 1 if in 2009 lack of demand was perceived as the main factor preventing the growth of the firm