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Manager Characteristics and Firm Performance

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Abstract

This paper studies the relationship between the performance of a firm and the characteristics of its manager for private and public firms in Japan. We use a panel data of firms from 2006-2016 that covers over two-thirds of aggregate employment and is representative of the firm size distribution. We find that firm performance measures—size, growth, and sales per employee—are higher in firms with managers who are male, more educated, and whose self-reported hometown differs from the location of the firm he or she manages (migrant managers). We also find an inverted-U relationship between firm performance level and manager's age, and that growth rate declines with the manager's age. Firm performance first increases with age until middle age, after which it declines with age. However, managers with characteristics that are associated with good performance do not necessarily perform better in recessions: male and migrant managers cut back more on sales and employment during the 2008-2009 recession. These results hold even after controlling for firm characteristics such as industry, age, location, and family ownership. Our results are consistent with human capital and risk preference affecting the productivity of managers. They suggest that demographic shifts—aging, rising female labor participation and education attainment, change in migration patterns—may affect economic growth through the distribution of managerial productivity.

Keywords: Firm performance, Managers, Risk preference, Demographic change, Economic growth
JEL Classification: L25, M21, J11, O32, O33

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1. Introduction

Measures of firm productivity and size vary significantly across firms, even in narrowly defined industries. The bulk of this variation can not be explained by measurable factors such as differences in the quality of inputs (see Syverson (2004)). Various studies have related the dispersion in productivity to macro outcomes. For example, Hsieh and Klenow (2009) and Bartelsman et al. (2013) wrote on the implications of the dispersion for cross-country differences in productivity. Fukao and Kwon (2006) found that increasing dispersion in productivity could explain the prolonged economic stagnation in Japan. Hence, it is important to understand what drives the large dispersion in firm productivity.

In this paper, we consider the demographic characteristics of managers as a determinant of firm productivity and size. We believe it is important to study the manager margin because Bloom et al. (2013) and the associated literature show that management practice have large impact on firm performance. Also, Japan as well as many other developed countries are experiencing aging, rising female labor participation and changing migration patterns. Recent papers such as Acemoglu and Restrepo (2017) and Engbom (2017) debates about whether changes in demographic patterns can explain the U.S. secular stagnation. Feyrer (2011) in particular finds that the changes in the age composition of managers contributes significantly to changes in productivity growth in the U.S. during 1960–2005.

We use a large panel of firms from Tokyo Shoko Research that covers two-thirds of employment of public and private firms in Japan. The dataset is unique in that it not only contains commonly used firm performance measures such as employment and sales but also details on the characteristics of its managers such as age, gender, education and even name.

Our preliminary analysis yields several interesting findings. First, we find that even after controlling for firm characteristics such as location, industry and age, manager characteristics are systematically correlated with firm per-

formance. Firms with managers who are male, more educated and from a prefecture different from the firm location tend to be bigger and have higher sales per worker. Male, more educated and migrant managers are also associated with faster growth. Firm performance is non-monotonically related to manager's age. Sales, for example, first increase with age til around their 40s, after which performance declines with age. Our results are robust to controlling for family ownership, listing status and relationship with other firms.

However, surprisingly, manager characteristics associated with bigger and faster growing firms on average over time do not predict better performance during the economic recession in 2008-2009 which is arguably triggered by an exogenous negative demand shock from the U.S. For example, migrant managers perform better on average but also have higher size dispersion in the cross-section and higher volatility of growth over time. Our findings suggest that part of the observed relationship between manager characteristics and performance may be due to difference in risk preference rather than difference in ability.

Our paper is closely related to Bertrand and Schoar (2003) and Gabaix and Landier (2008) which study the relationship between management and firm decision and performance for U.S. public companies. Bertrand and Schoar (2003) shows that management personalities matters for corporate decisions in U.S. public companies. They also find that firms with older managers are more conservative while MBA graduates are more aggressive. We differ in that we examine both private and public firms.

We are also closely related to the literature on management practice such as those cited in Bloom and Van Reenen (2010). This literature examines the role of measurable management practice in explaining differences in firm productivity. Bloom et al. (2013), for example, provide evidence that management practice matters for firm performance in India. Furthermore, Bloom and Van Reenen (2007) find that family owned firms with managers chosen by primogeniture tend to have worse management practices. The characteristics of managers we

study could be affecting firm performance through adoption of different management practices.

The paper is organized in the following way. In section 2. and 3., we describe the data and compare the data to public Census. In section 4. we describe our preliminary empirical findings.

2. Data

Our main source of data comes from Tokyo Shouko Research (TSR), which is the largest credit rating agency in Japan. Their data is known for its coverage and rich information of small private firms. For example, it used by the Japanese government white papers such as the White Paper on Small and Medium Enterprises[1]. We have an unbalanced panel with 1.1 to 1.5 million firms and around 30 million workers per year from 2006 to 2016 (see Appendix A for sample size by year). Compared to the 2014 Economic Census, the 2014 TSR data covers 66% of firms and 70% of employment[2]. Figures 1, 2, and 3 shows that the data is representative in that the employment (weighted and unweighted) and paid-in-capital distributions are very similar to the Census.

We observe the balance sheets of these firms as well as information on their incorporation date, legal status, detailed industry classification, listing status etc. Furthermore, we observe a rich set of variables on the manager of the firms (See Appendix A for details on the definition of a manager). For example, we observe the manager's name, age, gender, last school attended and place of origin. We also observe the name of the manager, which allows us to uniquely identify the manager of a firm in each year.

We supplement our dataset with a survey of managers and management practice conducted by the consulting company Accenture for The Small and

[1]This dataset was also used in Bernard et al. (forthcoming).

[2]Census benchmarks are the number of regular employment (*jyouyoukoyou*) of firms (*kaishakigyou*) in Table 2 of https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&tstat=000001072573&cycle=0&tclass1=000001074966&tclass2=000001077017&second2=1.

Figure 1: Firm distribution: TSR vs Census

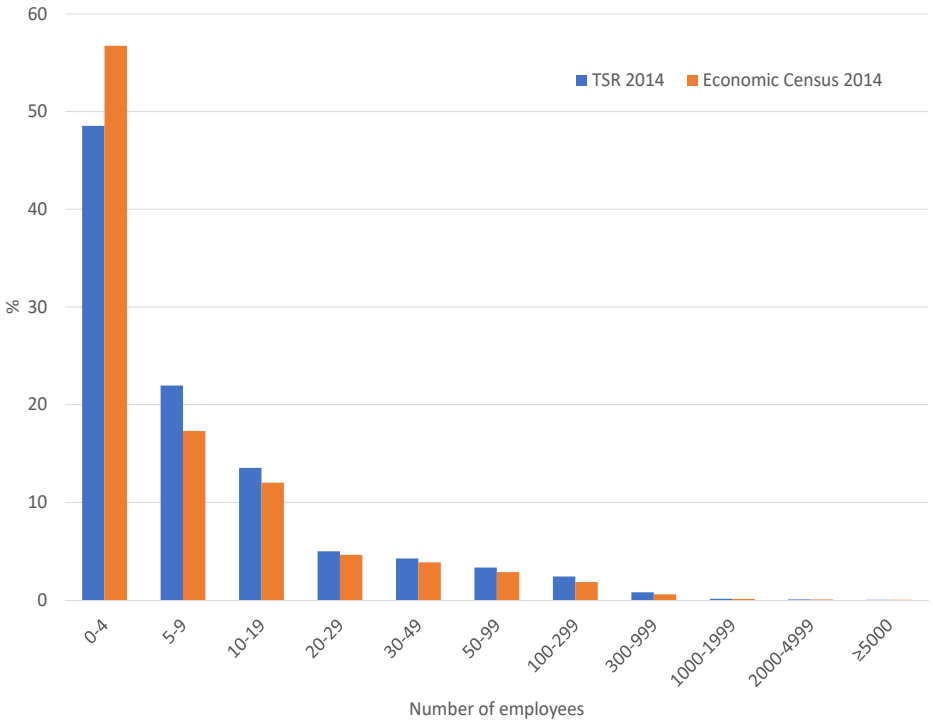


Figure 2: Employment distribution: TSR vs Census

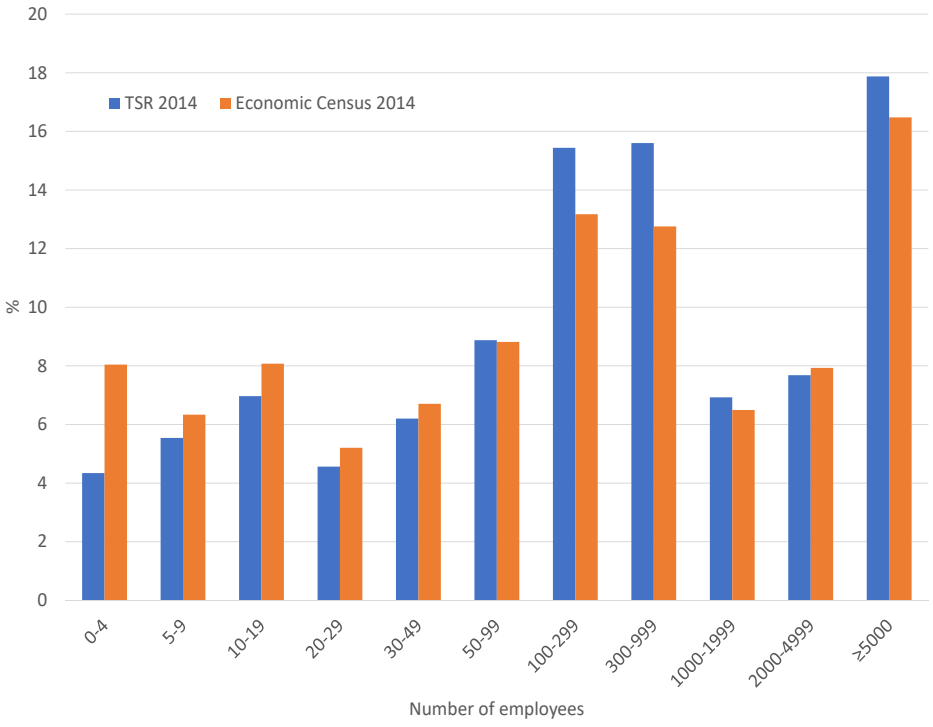
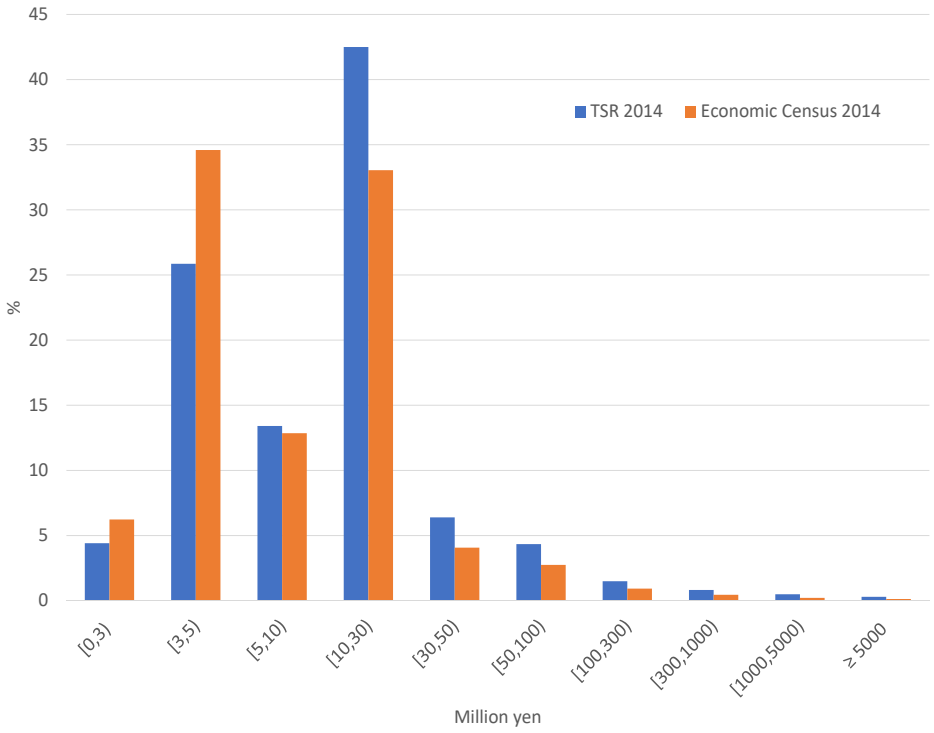


Figure 3: Paid-in capital distribution (unweighted): TSR vs Census



Medium Enterprise Agency.

3. Descriptive statistics

Our dataset is unique in having managerial characteristics on a large and representative sample of firms. Here we layout some novel descriptive patterns of manager characteristics and correlation between firm and manager characteristics. Figure 4 compares the percent of population between 18-90 years old in the 2011 TSR data with the 2011 population Census[3]. The age distribution of managers is older than the population. For example, about one third of the managers in our dataset is 65 years old or older while one quarter of the 24-79 years old population is 65 years or older. Our dataset however picks up the dip at age 45 and the peak at age 62 to 63 in the Census data. Figure 5 and 6 shows that there is aging in both managers and the general population. Also the managers and population appear to age at the same rate. Over the 10 years in our sample, the median age of managers increased from 59 to 61 and the mean increased from 59 to 60.

Figure 7 displays the share of female managers in our dataset. First, the share is very low: less than 10% compared to the share of female in the general population (51.5% in 2011) and the share of female in the work force (36% in 2015)[4]. Second, the share of female managers increased from 5% to 7% over the 10 years spanned by our data. This is slightly faster than the rise in the share of female workers, which increased from 32% in 2005 to 35% in 2015.[5].

Manager's education attainment have increased over time. Figure 8 shows

[3]Census data comes from Table 1 of https://www.e-stat.go.jp/en/stat-search/files?page=1&layout=datalist&toukei=00200524&tstat=000000090001&cycle=7&year=20110&month=0&tclass1=000001011679. We use 18-90 for the managers age range in TSR

[4]In 2011 population census, 51.5% of the population aged 18-90 years are female. In the 2015 Census (https://www.e-stat.go.jp/dbview?sid=0003174621), 36% of workers (*shugyousha omonishigoto*) aged 15 and above are female.

[5]Source: https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00200521&tstat=000001007251&cycle=0&tclass1=000001007398&tclass2=000001007541&tclass3=000001007542&stat_infid=000000038461&cycle_facet=cycle&second=1&second2=1

Figure 4: Age distribution in 2011: TSR vs Census

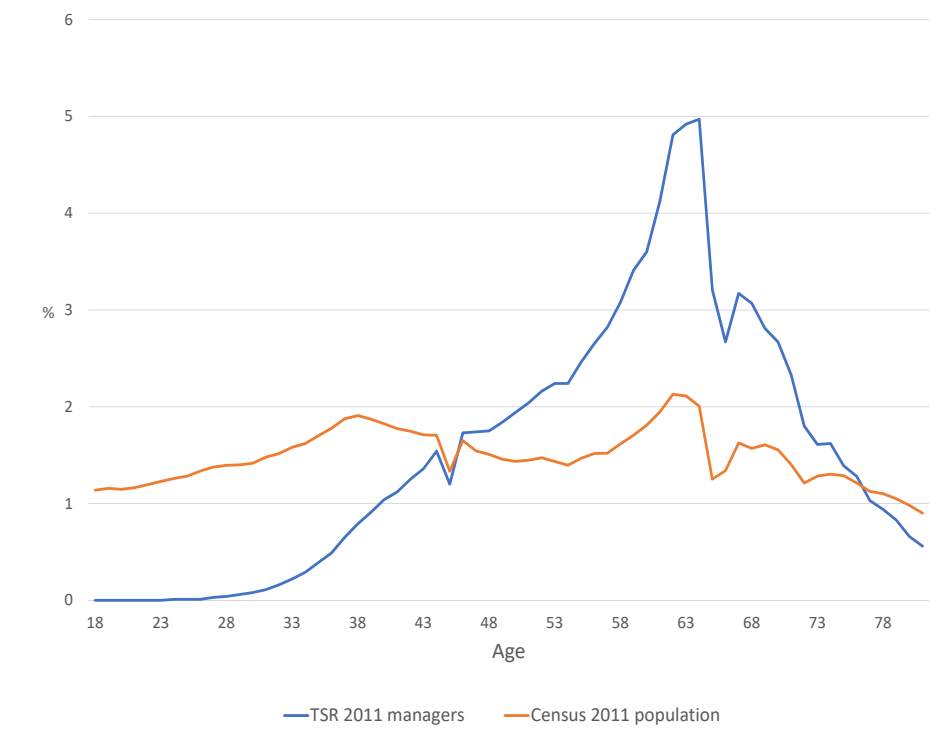


Figure 5: Aging in TSR data

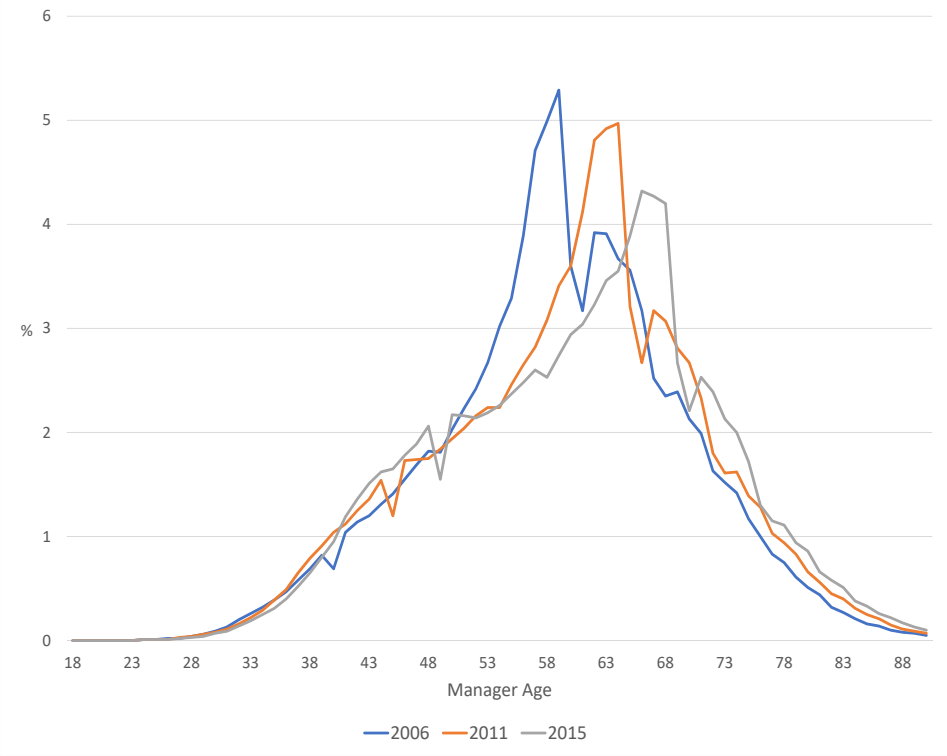


Figure 6: Aging in the Census

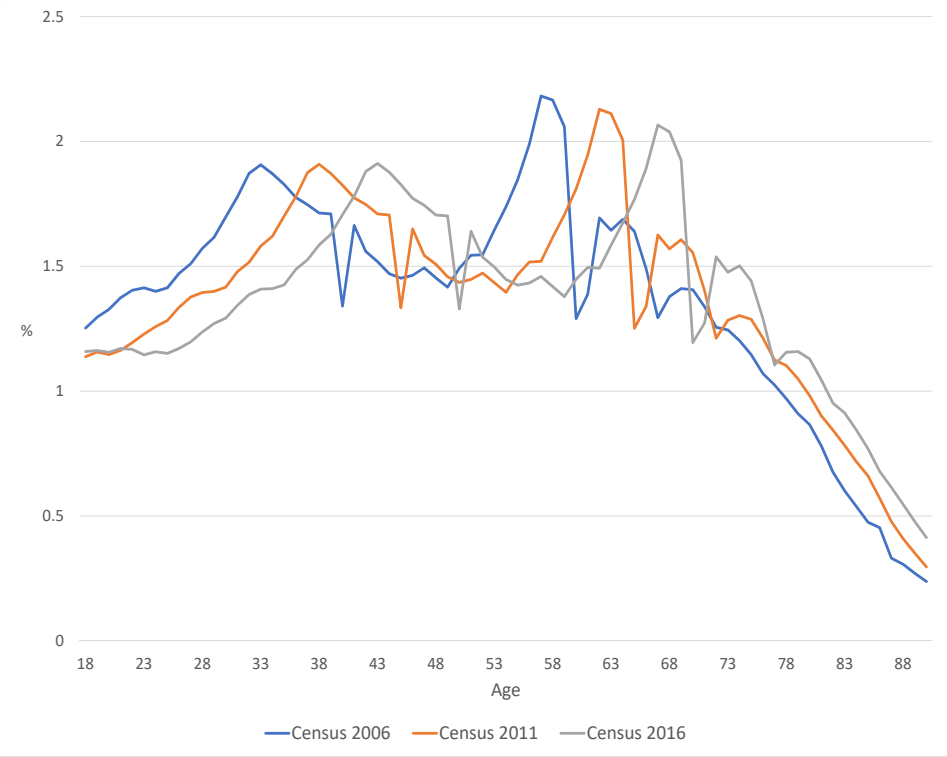
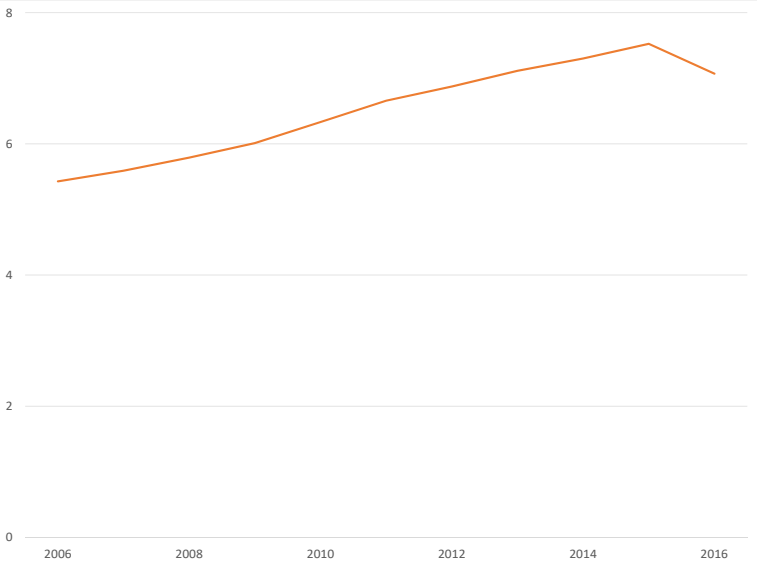


Figure 7: Share of female managers in TSR data (%)



the share of managers by education attainment. In the beginning of our sample, there were more managers with high school education than managers with 4 year university education. Over the sample, the share of managers with high school or 2 year college education shrunk. By the end of our sample, half of the managers have 4 years or more university education.

Figure 9 displays the migrant share of managers in our dataset. We calculate migrant share as the share of managers whose self-reported place of origin differs from the location of the firm he or she manages. About half of the managers are migrants. The share of migrants increased steadily over time from 41% in 2006 to 55% in 2016.

In this section, we documented some changes in the demographics of managers. Next we document how managers characteristics relate to firm performance in our dataset.

Figure 8: Share of managers in TSR data by education (%)

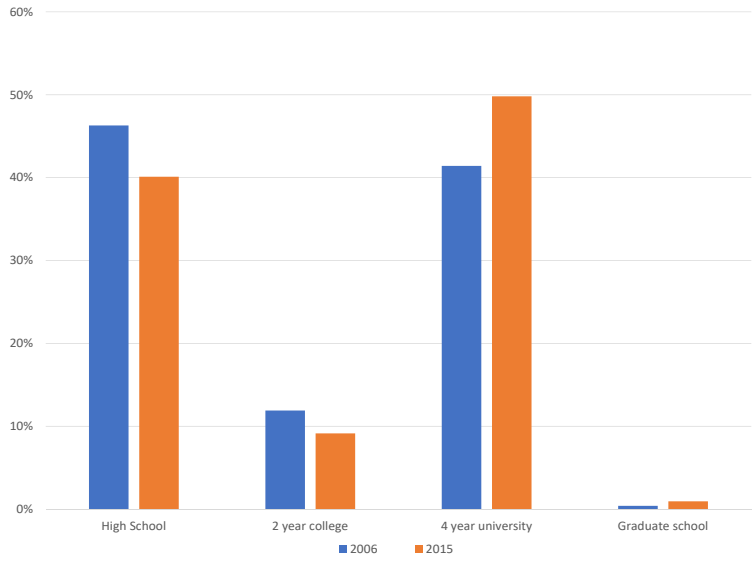
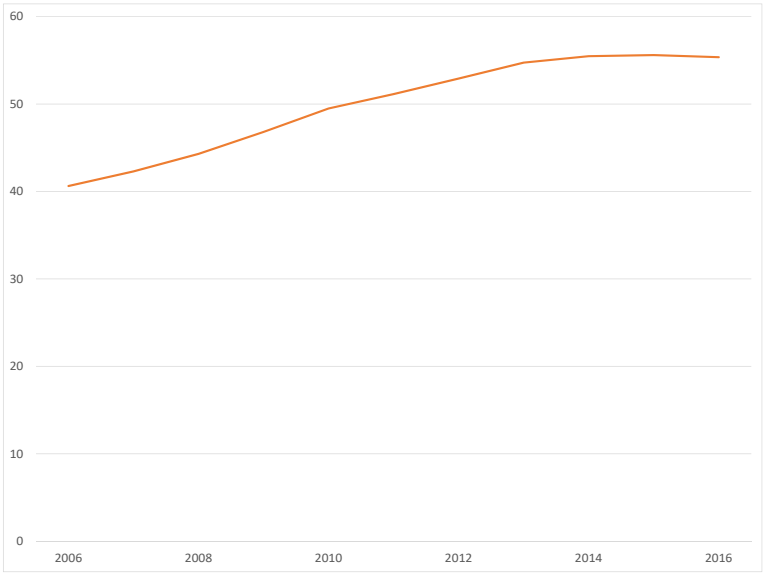


Figure 9: Share of migrant managers in TSR data (%)



Share of migrant managers is calculated as the share of managers whose self-reported place of origin differs from the location of the firm he or she manages.

4. Empirical patterns

Let i denote a firm and t the year. We first ran the following regression:

$$\begin{aligned}\text{Performance}_{it} &= \alpha_0 \text{FirmAge}_{it} + \alpha_1 \text{FirmAge}_{it}^2 + \text{Industry FE}_{it} + \text{Year FE}_{it} \\ &+ \text{Prefecture FE}_{it} + \alpha_2 \text{Dependent}_{it} + \alpha_3 \text{FamilyFirm}_{it} \\ &+ \beta_0 \text{Age}_{it} + \beta_1 \text{Age}_{it}^2 + \beta_2 \text{MALE}_{it} + \beta_3 \text{Educ}_{it} \\ &+ \beta_4 \text{Hometown}_{it} + \beta_5 \text{ExperBankruptcy}_{it} \qquad (1)\end{aligned}$$

The first two lines of the regression are firm characteristics. We control for firm age, 2-digit industry, year, the prefecture the firm is located in, whether the firm is a subsidiary or contractor of another firm and whether the firm is a family firm. We calculate firm age as the difference between the survey year and the year of establishment. We identify family firms as firms whose list of board members and stockholders includes a name that starts with the same Chinese character (*kanji*) as the name of its manager. Family firms makes up about 75% of our observations (firm-year). The share of family firms have been declining over time.

The last two lines contain the characteristics of the manager of the firm at time t. We control for age, gender, education, whether the manager is from the same prefecture as the firm, and whether the manager experienced bankruptcy in the past. For education, we observe the name of the last school the managers attended. We classify education into four categories and convert them into the number of years in school: 1) high school = 12 years, 2) two-year college = 14 years, 3) four-year university = 16 years, and 4) graduate school = 18 years. We use the number of years of education in the regression. We measure performance by log of employment, log of sales, log of sales per employee, score and exit [6].

[6] Sales and sales per employee are deflated by GDP deflator.

4.1. Sales, growth of sales and manager characteristics

Table 1 displays the results from regressing log sales on manager characteristics. The first column shows the results without any controls for firm characteristics. It shows that sales has an inverted-U relationship with manager's age. Sales increases with manager's age until age 47 (s.e. 0.3) and then declines with age [7]. The column also shows that male managers have 36% larger sales than female managers. Increasing education by one year is associated with 21% higher sales. Firms that are located in its manager's place of origin have 26% smaller sales compared to firms who are managed by migrant managers. Managers with bankruptcy experience is associated with 24% larger sales.

To investigate the robustness of these relationships, we gradually add firm and time controls to the regression. In the second column of Table 1, we report the results after controlling for year fixed effects. The coefficients barely changed. In the third column, we include fixed effects for the firm's industry and prefecture. The results are qualitatively the same as without the controls. Performance peaks at the same age as without the new controls. The absolute magnitude of the coefficients on the other characteristics declines. This suggests that managers of different characteristics select into different industries or locations. For example, male managers may select into firms that operate in industries with larger firms. Nonetheless, we still find strong relationships between manager's characteristics and sales.

As firm age and manager's age may be correlated, in the fourth column, we add firm age and the square of firm age as controls. Interestingly, sales also have an invert-U shape with firm age. Controlling for firm age does not brings down the point estimate of the age at which managers peak in sales to 42 years old. The coefficients on the other characteristics are qualitatively the same as without controlling for firm age.

In the last two columns of Table 1, we control for a firm's dependency on other firms and family firm. Our preferred specification is the last column be-

[7] The age-sales and age-growth of sales profile are shown in Appendix figure B.1 .

cause it controls for the most number of firm characteristics. In this specification, male managers have 20% larger sales than female managers, adding one year of education is associated with 11% increase in sales. Firms in the hometown of its managers have 20% smaller sales whereas firms with managers who have experienced bankruptcy in the past have 5% larger sales. Sales increases with manager's age uptil 38.57 (s.e. 0.48) years old and then declines with manager's age.

Table 2 displays the relationship between the growth rate of sales and manager characteristics. Comparing the columns shows that the relationship is qualitatively the same regardless of firm controls. As shown in Appendix figure **??**, the growth of sales declines with age. In the last column where we control for the most number of firm characteristics, we find that male managers are associated with around 0.5 percentage points higher growth rate of sales. One additional year of education is associated with 0.05 percentage points higher growth rate of sales while migrant managers have 0.13 percentage points higher growth rate of sales. Managers with bankruptcy experience have higher level of sales but lower growth rate of sales. Growth rate of sales declines with manager age and firm age in the empirically relevant age range.

4.2. Employment, growth of employment and manager characteristics

Table 3 displays the results from regressing log employment on manager characteristics. The results are qualitatively similar to the results for sales. The first column shows that without additional controls, employment increases with manager's age until age 48.49 (s.e. 0.553) and then declines with age [8]. Male managers have 21% larger employment while increasing education by one year is associated with 15% higher employment. Firms that are located in the its manager's place of origin is associated with 15% smaller employment while

[8]The age-employment and age-growth of employment profile are shown in Appendix figure B.3 .

firms managed by managers with bankruptcy experience have 25% larger employment. Adding year and industry fixed effects and firm age terms reduces the absolute magnitude of the coefficients somewhat but does not change the qualitative patterns. Controlling for firm age brings down the age at which managers peak in employment to 34.57 (s.e. 0.917) years old.

In the last two columns of Table 3, we control for a firm's dependency on other firms and family firm. The invert-U relationship between employment and manager's age disappears when we control for dependency only but reappears when we control for both dependency and family ownership. In our preferred specification with all of the controls, employment peaks at 22 years old. Male managers have 10% larger employment than female managers, adding one year of education is associated with 7% increase in employment. Firms in the hometown of its managers have 15% smaller employment whereas firms with managers who have experienced bankruptcy in the past have 7% larger employment. Unlike the sales, employment declines with age over the empirically relevant range of manager's age in our data. However, similar to sales, employment rise with firm age for the empirically relevant range.

In Table 4, we report the relationship between the growth rate of employment and manager characteristics. Similar to sales, the growth rate of employment declines with both managers and firm age over the empirically relevant age range. Male managers and migrant managers have higher growth rate of employment. Managers with bankruptcy experience grows slower. Unlike sales, more educated managers are slower in adding workers. Again these patterns are robust to removing and adding controls.

4.3. Revenue labor productivity and manager characteristics

Table 5 displays the results from regressing log sales per employee on manager characteristics. Some results are qualitatively similar to the results for sales and employment. In the last column with the most number of firm controls, male

managers also have 10% or more sales per employee. Managers with more education and migrant managers are also associated with higher sales per employee. Sales per employee increases with manager's age til age 45.76 (s.e. 0.275) after which it declines with manager's age [9]. Sales per employee declines with firm age for the interquartile range of age in our data.

Table 6 displays the relationship between the growth rate of sales per employee with manager characteristics. The growth rate of sales per employee declines with manager's age for empirically relevant range of age as shown in the Appendix figure **??**. The growth rate of sales per employee declines with firm age to around 41 years old after which it rises with firm age. While male managers and migrant managers have higher growth rate of sales and employment, we do not find statistically significant relationship with the growth rate of sales per employee. More educated managers have higher growth rate of sales per employee, reflecting their higher growth rate of sales and lower growth rate of workforce size. Bankruptcy experience does not predict stronger growth rate of sales per employee.

4.4. Exit probability and manager characteristics

We identify exit using TSR's register of active/inactive firms. Through in-person and on-site survey, TSR determines whether a firm is active on the survey date. We define a firm as having exited in year t if TSR identified it as inactive in t, $t-1$, $t+1$ in the activity register. Table 7 displays the results from regressing the exit dummy on manager characteristics, varying the controls for firm characteristics. We find that exit probability declines with firm and manager age over the empirically relevant age range. Gender does not predict exit while managers with higher education actually have higher exit probability. Migrant managers, while having higher employment and sales, also have higher exit probability. Firms managed by managers with bankruptcy experience are also more likely

[9] The age-labor productivity and age-growth of labor productivity profile are shown in Appendix figure B.2.

to exit.

4.5. TSR score and manager characteristics

Table 8 displays the results from running regression 1 with TSR score as the left-hand-side variables. TSR score is a number assigned by TSR agents who surveyed the company and interviewed the manager. Higher score means better evaluation. This may contain soft information not captured by our sales, employment numbers such as business policy, manager vision and local economic conditions.

All characteristics except for bankruptcy experience, the TSR score has qualitatively the same relationship with manager's characteristics as sale and employment. TSR score has an inverted-U shape relationship with managers age, peaking around age 47. Male, more educated and migrant managers tend to have higher scores. Despite having larger sales and employment, managers with bankruptcy experience tend to receive lower score.

4.6. Robustness check: family vs non-family firms

We test the robustness of our findings by running the regression within three subsamples: unlisted-independent firms, family firms and non-family firms (see Table 9, 10 an 11). First, in all three subsample and the combined sample, male managers, more educated managers and migrant managers are associated with larger sales, employments and sales per employee. For all three performance measures, the coefficients on manager characteristics is much larger for non-family firms. This could be due to managers having less direct control over firm strategies when other family members are actively involved in the business.

In all three subsamples and the combined sample, sales and sales per employee have an inverted-U relationship with manager's age, although the age at which sales and sales per employee peaks differs between subsamples. Firm

Table 1: Sales and manager characteristics

	Dependent var: log sales					
Age	0.0500***	0.0499***	0.0518***	0.0484***	0.0325***	0.0361***
	(0.0013)	(0.0013)	(0.0012)	(0.0013)	(0.0012)	(0.0012)
Age^2	-0.000527***	-0.000525***	-0.000557***	-0.000582***	-0.000444***	-0.000469***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Is male	0.359***	0.358***	0.290***	0.249***	0.185***	0.199***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Educ	0.213***	0.212***	0.170***	0.158***	0.114***	0.110***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Hometown	-0.261***	-0.260***	-0.173***	-0.298***	-0.175***	-0.204***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Experienced	0.239***	0.243***	0.179***	0.119***	0.0660**	0.0489*
Bankruptcy	(0.029)	(0.029)	(0.027)	(0.028)	(0.026)	(0.026)
Firm Age				0.0158***	0.0180***	0.0172***
				(0.0003)	(0.0003)	(0.0003)
$Firm\ Age^2$				-4.94e-05***	-6.48e-05***	-6.00e-05***
				(0.000003)	(0.000002)	(0.000002)
N	5783422	5783422	5549614	5047701	5047701	5047701
R^2	0.077	0.079	0.196	0.218	0.304	0.313
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 2: Growth of sales and manager characteristics

	Dependent var: Δ log sales					
Age	-0.00391***	-0.00354***	-0.00348***	-0.00291***	-0.00307***	-0.00299***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age^2	2.10e-05***	1.74e-05***	1.68e-05***	1.42e-05***	1.56e-05***	1.50e-05***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Is male	0.00343***	0.00357***	0.00371***	0.00448***	0.00381***	0.00407***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Educ	0.00104***	0.000682***	0.000454***	0.00100***	0.000547***	0.000450***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown	-0.00455***	-0.00478***	-0.00558***	-0.00206***	-0.000771**	-0.00134***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experienced	-0.0548***	-0.0546***	-0.0548***	-0.0523***	-0.0529***	-0.0532***
Bankruptcy	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Firm Age				-0.00111***	-0.00109***	-0.00111***
				(0.0000)	(0.0000)	(0.0000)
Firm Age^2				7.66e-06***	7.50e-06***	7.58e-06***
				(0.000000)	(0.000000)	(0.000000)
N	4876248	4876248	4676122	4267680	4267680	4267680
R^2	0.002	0.011	0.012	0.013	0.014	0.014
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 3: Employment and manager characteristics

	Dependent var: log employment					
Age	0.0192***	0.0196***	0.0197***	0.0156***	0.00416***	0.00622***
	(0.0010)	(0.0010)	(0.0009)	(0.0010)	(0.0009)	(0.0009)
Age^2	-0.000198***	-0.000201***	-0.000205***	-0.000226***	-0.000127***	-0.000141***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Is male	0.211***	0.211***	0.170***	0.139***	0.0934***	0.101***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)
Educ	0.154***	0.153***	0.124***	0.108***	0.0769***	0.0744***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Hometown	-0.146***	-0.146***	-0.103***	-0.225***	-0.138***	-0.154***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Experienced	0.247***	0.247***	0.174***	0.113***	0.0757***	0.0662***
Bankruptcy	(0.022)	(0.022)	(0.020)	(0.020)	(0.019)	(0.019)
Firm Age				0.0206***	0.0222***	0.0217***
				(0.0002)	(0.0002)	(0.0002)
$Firm\ Age^2$				-8.77e-05***	-9.88e-05***	-9.61e-05***
				(0.000002)	(0.000002)	(0.000002)
N	5746202	5746202	5512826	5028127	5028127	5028127
R^2	0.059	0.061	0.212	0.252	0.327	0.332
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 4: Growth of employment and manager characteristics

	Dependent var: Δ log employment					
Age	-0.00181***	-0.00167***	-0.00169***	-0.00135***	-0.00137***	-0.00138***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age^2	1.06e-05***	9.20e-06***	9.40e-06***	8.52e-06***	8.76e-06***	8.78e-06***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Is male	0.00285***	0.00286***	0.00279***	0.00398***	0.00386***	0.00385***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Educ	-0.000675***	-0.000810***	-0.000781***	-0.000284***	-0.000364***	-0.000359***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown	-0.00511***	-0.00518***	-0.00485***	-0.00124***	-0.00101***	-0.000988***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experienced	-0.0514***	-0.0515***	-0.0508***	-0.0493***	-0.0494***	-0.0494***
Bankruptcy	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Firm Age				-0.000975***	-0.000971***	-0.000971***
				(0.0000)	(0.0000)	(0.0000)
Firm Age^2				6.15e-06***	6.12e-06***	6.12e-06***
				(0.000000)	(0.000000)	(0.000000)
N	4993574	4993574	4787891	4381887	4381887	4381887
R^2	0.001	0.002	0.003	0.004	0.004	0.004
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 5: Revenue labor productivity and manager characteristics

	Dependent var: log sales per employee					
Age	0.0310***	0.0306***	0.0329***	0.0333***	0.0287***	0.0304***
	(0.0008)	(0.0008)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Age^2	-0.000331***	-0.000326***	-0.000361***	-0.000360***	-0.000321***	-0.000332***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Is male	0.146***	0.146***	0.120***	0.110***	0.0920***	0.0982***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Educ	0.0604***	0.0608***	0.0464***	0.0499***	0.0374***	0.0354***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Hometown	-0.119***	-0.118***	-0.0761***	-0.0735***	-0.0384***	-0.0515***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Experienced	-0.0182	-0.0146	-0.004	-0.000338	-0.0154	-0.0229
Bankruptcy	(0.017)	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
Firm Age				-0.00484***	-0.00422***	-0.00457***
				(0.0001)	(0.0001)	(0.0001)
$Firm\ Age^2$				3.83e-05***	3.39e-05***	3.61e-05***
				(0.000001)	(0.000001)	(0.000001)
N	5736323	5736323	5503592	5021410	5021410	5021410
R^2	0.032	0.034	0.206	0.211	0.233	0.239
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 6: Growth of revenue labor productivity and manager characteristics

	Dependent var: Δ log sales per employee					
Age	-0.00196***	-0.00174***	-0.00168***	-0.00146***	-0.00159***	-0.00151***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Age^2	9.36e-06***	7.12e-06***	6.49e-06***	4.80e-06***	5.93e-06***	5.38e-06***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Is male	0.000674	0.000771	0.000968	0.00051	-4.13E-05	0.000227
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Educ	0.00168***	0.00148***	0.00125***	0.00126***	0.000887***	0.000785***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown	0.000872***	0.000665**	-0.000689**	-0.000761**	0.000303	-0.000288
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experienced	-0.00346	-0.00329	-0.00414	-0.00328	-0.00374	-0.00407
Bankruptcy	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Firm Age				-0.000111***	-9.28e-05***	-0.000107***
				(0.0000)	(0.0000)	(0.0000)
Firm Age^2				1.34e-06***	1.21e-06***	1.29e-06***
				(0.000000)	(0.000000)	(0.000000)
N	4827256	4827256	4628320	4237338	4237338	4237338
R^2	0.001	0.006	0.007	0.007	0.007	0.007
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES
Firm Age	NO	NO	NO	YES	YES	YES
Dependent	NO	NO	NO	NO	YES	YES
Family	NO	NO	NO	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 7: Exit probability and manager characteristics

	Dependent var: Exit dummy					
Age	-0.000261***	-0.000321***	-0.000328***	-0.000310***	-0.000366***	-0.000362***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Age^2	3.24e-06***	3.83e-06***	3.90e-06***	3.91e-06***	4.40e-06***	4.37e-06***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Is male	-5.34E-05	-8.83E-05	5.19E-05	1.62E-04	-3.14E-05	-1.85E-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Educ	0.000248***	0.000272***	0.000269***	0.000336***	0.000213***	0.000210***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown	-0.00184***	-0.00182***	-0.00201***	-0.00153***	-0.00117***	-0.00120***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experienced	0.0134***	0.0134***	0.0129***	0.0126***	0.0125***	0.0125***
Bankruptcy	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm age				-8.32e-05***	-7.73e-05***	-7.80e-05***
				(0.0000)	(0.0000)	(0.0000)
Firm age^2				4.41e-07***	3.98e-07***	4.02e-07***
				(0.000000)	(0.000000)	(0.000000)
Dependent					0.00510***	0.00523***
firm					(0.000)	(0.000)
Family						0.000450***
firm						(0.000)
N	5,558,097	5,558,097	5,334,709	4,850,956	4,850,956	4,850,956
R^2	0	0.001	0.001	0.001	0.002	0.002
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 8: TSR score and manager characteristics

	Dependent var: Score					
Age	0.272***	0.241***	0.230***	0.205***	0.146***	0.149***
	(0.0052)	(0.0053)	(0.0051)	(0.0054)	(0.0052)	(0.0052)
Age^2	-0.00242***	-0.00212***	-0.00208***	-0.00208***	-0.00157***	-0.00160***
	(0.00005)	(0.00005)	(0.00004)	(0.00005)	(0.00004)	(0.00004)
Is male	0.945***	0.931***	0.806***	0.649***	0.447***	0.456***
	(0.030)	(0.030)	(0.029)	(0.031)	(0.030)	(0.030)
Educ	0.624***	0.636***	0.528***	0.477***	0.349***	0.347***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Hometown	-0.0744***	-0.0602***	-0.292***	-0.731***	-0.361***	-0.378***
	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)	(0.015)
Experienced	-7.613***	-7.523***	-7.718***	-7.994***	-8.177***	-8.187***
Bankruptcy	(0.167)	(0.166)	(0.169)	(0.173)	(0.173)	(0.173)
Firm age				0.0818***	0.0879***	0.0874***
				(0.0010)	(0.0009)	(0.0009)
Firm age^2				-0.000411***	-0.000456***	-0.000453***
				(0.000009)	(0.000009)	(0.000009)
Dependent					5.312***	5.399***
firm					(0.026)	(0.026)
Family						0.307***
firm						(0.019)
N	5,546,481	5,546,481	5,323,374	4,843,431	4,843,431	4,843,431
R^2	0.051	0.06	0.134	0.157	0.218	0.218
Year FE	NO	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES	YES
Firm loc FE	NO	NO	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

sales peaks when the manager is around 30.88 (s.e. 0.929) for family firms while it peaks at age 58.08 (s.e. 0.261) for non-family firms. Similarly, sales per employee peaks when the manager is around 44.61 (s.e. 0.350) for family firms while it peaks around age 57.76 (s.e. 0.607) for non-family firms. Similar to the full sample, employment does not have an inverted-U relationship with manager's age for family firms but it does for non-family firms. Bankruptcy experience does not predict performance for family firms while they are negatively correlated with performance for non-family firms. One possible reason for this is that family financing mitigates financial frictions. This is consistent with TSR giving a lower score to managers with bankruptcy experience. Overall, our findings for manager's gender, migrant status and education appear to be robust to controlling for ownership structure while the qualitative relationship between managers age for employment and bankruptcy experience may be sensitive to ownership structure.

4.7. Robustness check: selection

Since exit is correlated with some of the manager characteristics, we check if our results are driven by selection through firm exits. In Tables **??** we restrict the sample to firms that have no missing data from 2006-2015[10]. We find that the relationship between managers characteristics and firm performance is even stronger in the balanced sample except for the relationship between bankruptcy experience and log sales per employee where it is negative in the full sample but not significantly different from zero in the balanced panel. In particular, the difference between male vs female, education, migrant vs non-migrant is even bigger in the balanced sample. This suggests that these gaps in performance is not coming from selection through exit.

In the balanced panel, there is also an inverted-U shape relationship between managers age and firm performance, with the peak somewhat later than

[10]We do not use 2006-2016 because the sample size in 2016 is about half of other years due to timing of the survey

the full sample: 46.77 (s.e. 0.390) vs 45.76 (s.e. 0.275) for log sales per employee, 41.75 (s.e. 0.578) vs 38.57 (s.e. 0.476) for log sales and 33.41 (s.e. 2.022) vs 22.08 (s.e. 1.630) for log employment.

4.8. Robustness check: firms with manager changes

About 9 to 11% fraction of firms each year change their managers (We identify change by the name of the manager). We use this to control for firm fixed effects. Specifically, for year t when a manager changes, we regress the level and growth rate of sales, employment and sales per employee in t on the change in manager characteristics.

$$\begin{aligned}
\text{Performance}_{it} &= \alpha_0 \text{Firm FE}_i + \alpha_1 \text{Year FE}_t + \alpha_2 \text{ManagerChange}_{it} \\
&+ \beta_0 \text{Age YO}_{it} + \beta_1 \text{Age YY}_{it} + \beta_2 \text{Age OO}_{it} + \beta_3 \text{Age OY}_{it} \\
&+ \gamma_0 \text{MM}_{it} + \gamma_1 \text{MF}_{it} + \gamma_2 \text{FF}_{it} + \gamma_4 \text{FM}_{it} \\
&+ \xi_0 \text{Educ HL}_{it} + \xi_1 \text{Educ HH}_{it} + \xi_2 \text{Educ LL}_{it} + \xi_3 \text{Educ LH}_{it} \\
&+ \mu_0 \text{Hometown 01}_{it} + \mu_1 \text{Hometown 00}_{it} \\
&+ \mu_2 \text{Hometown 11}_{it} + \mu_3 \text{Hometown 10}_{it} \qquad (2)
\end{aligned}$$

In the first row of the regression, we control for firm fixed effect, year fixed effect and a dummy for manager change. In the second row, we have dummies for manager age changing from young to old, young to young, old to old and old to young. Young is below 50 years old. These are interacted with ManagerChange so they only turn on when the manager changes. In the third row, we have dummies for when a male manager change to a male manager, male to female, male to female, female to female and female to male. In the fourth row we have the change in manager education when a switch happens. We classify education as high for four year university or more. The last two rows, we have dummies for when the manager changes from a non-migrant to a migrant, a non-migrant to non-migrant, a migrant to a migrant, and a migrant to a non-migrant.

In Table 13, we display the results. For the statistically significant coefficients, we find that firms that switched from a highly educated manager to a less educated manager had smaller growth in sales and employment and smaller sales and sales per employee than a firm that switched from a highly educated manager to a highly educated manager. For gender, we find that switching from male to female managers is associated with lower growth in sales and employment than switching from a male manager to a male manager. We also find that switching from a young to old manager is associated with lower sales and sales per employee growth than switching from a young to another young manager. Switching from an old to old manager is associated with lower sales and employment than switching from an old to young manager[11].

5. Why performance relate to manager characteristics (in progress)

There are many potential explanations for why firm performance systematically relate to manager characteristics even after controlling for firm characteristics. It could be difference in ability. For example, more educated managers may be better at adopting better management practices. Another candidate explanation is discrimination. Perhaps female managers perform worse because they face barriers in hiring, financing or forming business relationships. While these may be the most obvious explanations, we think risk preference may also play a role.

Our hypothesis is motivated by Japan's experience during the Great Recession. The Cabinet Office in Japan dates recession by peak to trough as February 2008 to March 2009. We interpret the 2008-2009 recession as an exogenous drop in aggregate demand from the U.S. recession. We expect that if firm performance reflects manager's ability or discrimination, managers who are better on

[11]The results change little when we use 1 and 2 year lag of independent variables

Table 9: Sales and manager characteristics, family versus non-family firms

	Dependent var: log sales			
	All	Unlisted-indep	Family firms	Non-Family firms
Age	0.0361***	0.0174***	0.0204***	0.192***
	(0.0012)	(0.0012)	(0.0013)	(0.0067)
Age^2	-0.000469***	-0.000308***	-0.000330***	-0.00165***
	(0.00001)	(0.00001)	(0.00001)	(0.00006)
Is male	0.199***	0.177***	0.186***	0.706***
	(0.009)	(0.009)	(0.009)	(0.049)
Educ	0.110***	0.107***	0.0897***	0.123***
	(0.001)	(0.001)	(0.001)	(0.005)
Hometown	-0.204***	-0.143***	-0.121***	-0.291***
	(0.004)	(0.004)	(0.005)	(0.016)
Experienced	0.0489*	0.135***	0.0308	-0.425***
Bankruptcy	(0.026)	(0.028)	(0.027)	(0.084)
Firm Age	0.0172***	0.0142***	0.0161***	0.0259***
	(0.0003)	(0.0003)	(0.0003)	(0.0010)
$Firm\ Age^2$	-6.00e-05***	-5.59e-05***	-6.32e-05***	-2.43e-05**
	(0.000002)	(0.000002)	(0.000002)	(0.000010)
N	5047701	4558671	4354365	297921
R^2	0.313	0.216	0.239	0.378
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 10: Employment and manager characteristics, family versus non-family firms

	Dependent var: log employment			
	All	Unlisted-indep	Family firms	Non-family firms
Age	0.00622***	-0.00799***	-0.00507***	0.147***
	(0.0009)	(0.0009)	(0.0009)	(0.0052)
Age^2	-0.000141***	-1.59e-05**	-4.45e-05***	-0.00127***
	(0.00001)	(0.00001)	(0.00001)	(0.00004)
Is male	0.101***	0.0846***	0.0930***	0.422***
	(0.006)	(0.006)	(0.007)	(0.036)
Educ	0.0744***	0.0728***	0.0612***	0.0876***
	(0.001)	(0.001)	(0.001)	(0.004)
Hometown	-0.154***	-0.106***	-0.0943***	-0.232***
	(0.003)	(0.003)	(0.003)	(0.013)
Experienced	0.0662***	0.135***	0.0563***	-0.355***
Bankruptcy	(0.019)	(0.020)	(0.020)	(0.067)
Firm Age	0.0217***	0.0195***	0.0213***	0.0252***
	(0.0002)	(0.0002)	(0.0002)	(0.0008)
$Firm\ Age^2$	-9.61e-05***	-9.35e-05***	-0.000102***	-4.11e-05***
	(0.000002)	(0.000002)	(0.000002)	(0.000008)
N	5028127	4540118	4341942	296069
R^2	0.332	0.252	0.265	0.365
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 11: Sales per employee and manager characteristics, family versus non-family firms

	Dependent var: log sales per employee			
	All	Unlisted-indep	Family firms	Non-family firms
Age	0.0304***	0.0259***	0.0258***	0.0472***
	(0.0007)	(0.0007)	(0.0007)	(0.0040)
Age^2	-0.000332***	-0.000296***	-0.000289***	-0.000409***
	(0.00001)	(0.00001)	(0.00001)	(0.00003)
Is male	0.0982***	0.0937***	0.0935***	0.291***
	(0.005)	(0.005)	(0.006)	(0.030)
Educ	0.0354***	0.0347***	0.0286***	0.0362***
	(0.001)	(0.001)	(0.001)	(0.003)
Hometown	-0.0515***	-0.0380***	-0.0274***	-0.0593***
	(0.002)	(0.003)	(0.003)	(0.009)
Experienced	-0.0229	-0.00536	-0.0297*	-0.0905*
Bankruptcy	(0.016)	(0.017)	(0.017)	(0.050)
Firm Age	-0.00457***	-0.00529***	-0.00523***	0.000685
	(0.0001)	(0.0002)	(0.0002)	(0.0005)
Firm Age^2	3.61e-05***	3.78e-05***	3.83e-05***	1.72e-05***
	(0.000001)	(0.000001)	(0.000001)	(0.000004)
N	5021410	4534454	4337012	295284
R^2	0.239	0.211	0.222	0.309
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 12: Regression 1 with a balanced panel

	log sales per employee		log sales		log employment	
	All	Balanced	All	Balanced	All	Balanced
Age	0.0304***	0.0283***	0.0361***	0.0404***	0.00622***	0.0121***
	(0.0007)	(0.0010)	(0.0012)	(0.0017)	(0.0009)	(0.0013)
Age^2	-0.000332***	-0.000303***	-0.000469***	-0.000483***	-0.000141***	-0.000181***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Is male	0.0982***	0.0832***	0.199***	0.195***	0.101***	0.112***
	(0.005)	(0.007)	(0.009)	(0.013)	(0.006)	(0.009)
Educ	0.0354***	0.0379***	0.110***	0.120***	0.0744***	0.0822***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Hometown	-0.0515***	-0.0602***	-0.204***	-0.242***	-0.154***	-0.182***
	(0.002)	(0.003)	(0.004)	(0.006)	(0.003)	(0.005)
Experienced	-0.0229	0.0309	0.0489*	0.133***	0.0662***	0.102***
Bankruptcy	(0.016)	(0.027)	(0.026)	(0.046)	(0.019)	(0.034)
Firm Age	-0.00457***	-0.00551***	0.0172***	0.0175***	0.0217***	0.0230***
	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0002)	(0.0003)
$Firm\ Age^2$	3.61e-05***	4.39e-05***	-6.00e-05***	-5.56e-05***	-9.61e-05***	-9.99e-05***
	(0.000001)	(0.000002)	(0.000002)	(0.000003)	(0.000002)	(0.000003)
N	5021410	3036654	5047701	3044463	5028127	3037707
R^2	0.239	0.265	0.313	0.344	0.332	0.36
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Firm Age	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES
Family	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 13: Manager changes and firm performance

	Δlog sales	Δlog emp	Δlog sales per emp	log sales	log emp	log sales per emp
Educ HL - HH	-0.014***	-0.00883**	-0.00462	-0.0155***	-0.0058	-0.0102**
	(0.00485)	(0.00423)	(0.00587)	(0.00515)	(0.00418)	(0.0052)
Educ LL – LH	0.00251	-0.003	0.0051	-0.00516	-0.00515*	-0.000191
	(0.00361)	(0.00308)	(0.00441)	(0.00356)	(0.00286)	(0.00371)
Gender FF – FM	0.00171	0.00589	-0.00647	-0.0129	-0.0047	-0.00987
	(0.0144)	(0.0118)	(0.018)	(0.0143)	(0.0118)	(0.0146)
Gender MF – MM	-0.0217***	-0.0176***	-0.00552	-0.00414	-0.000702	-0.00399
	(0.00803)	(0.00633)	(0.00967)	(0.00788)	(0.00573)	(0.00822)
Age YO – YY	-0.0247**	-0.00715	-0.0233*	-0.015	-0.0106	-0.00299
	(0.0121)	(0.0106)	(0.014)	(0.0125)	(0.01)	(0.0121)
Age OO – OY	0.00128	-0.000397	0.0017	-0.00968***	-0.00712***	-0.00254
	(0.00262)	(0.0023)	(0.00322)	(0.00269)	(0.00216)	(0.00276)
Hometown 10 – 11	0.00428	0.00185	0.00205	0.000691	0.00257	-0.00214
	(0.00428)	(0.00374)	(0.00516)	(0.00437)	(0.00357)	(0.00443)
Hometown 00 – 01	-0.000556	0.00507	-0.00381	-0.00299	5.66E-05	-0.00257
	(-0.00445)	(0.00396)	(0.00544)	(0.00465)	(0.0038)	(0.00464)
N	4773967	4893342	4728664	4953133	4,924,247	4,916,225
R^2	0.164	0.162	0.131	0.971	0.972	0.897
Industry FE	NO	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES
Firm loc FE	NO	NO	NO	NO	NO	NO
Firm FE	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

average should also fare better during this recession. To test this, we add to regression equation 1 an interaction term with a dummy term for recession years 2009 or 2010. The year variable in our dataset is survey year which contain a lag. So we took 2009 to 2010 as recession years. In our dataset, unweighted average sales growth rate bottomed out in 2009 while unweighted average employment growth rate bottomed out in 2010.

$$\begin{aligned}
\text{Performance}_{it} &= \alpha_0 \text{FirmAge}_{it} + \alpha_1 \text{FirmAge}_{it}^2 + \text{Industry FE}_{it} + \text{Year FE}_t \\
&+ \text{Prefecture FE}_{it} + \alpha_2 \text{Dependent}_{it} + \alpha_3 \text{FamilyFirm}_{it} \\
&+ \beta_0 \text{Age}_{it} + \beta_1 \text{Age}_{it}^2 + \beta_2 \text{MALE}_{it} + \beta_3 \text{Educ}_{it} \\
&+ \beta_4 \text{Hometown}_{it} + \beta_5 \text{ExperBankruptcy}_{it} \\
&+ \gamma_0 \text{FirmAge}_{it} \text{ X Rec}_t + \gamma_1 \text{FirmAge}_{it}^2 \text{ X Rec}_t \\
&+ \delta_0 \text{Age}_{it} \text{ X Rec}_t + \delta_1 \text{Age}_{it}^2 \text{ X Rec}_t \\
&+ \delta_2 \text{MALE}_{it} \text{ X Rec}_t + \delta_3 \text{Educ}_{it} \text{ X Rec}_t \\
&+ \delta_4 \text{Hometown}_{it} \text{ X Rec}_t + \delta_5 \text{ExperBankruptcy}_{it} \text{ X Rec}_t \qquad (3)
\end{aligned}$$

Table 14 displays the results. First, the coefficients on manager characteristics are qualitatively similar to that for regression 1. However, the employment gap between female and male managers shrunk during the recession. The employment and sales gap between migrant and non-migrant managers also shrunk. On the other hand, the sales and sales per employee gap between more educated and less educated managers widened while the employment gap shrunk.

The results in Table 14 could be driven by exit during the recession. In Table 15, we use the balanced sample with firms that continuously operated from 2006 to 2015. Similar to the entire sample, the gender gap and migration gap shrunk but unlike the entire sample, sales and sales per employee gap associated with education shrunk instead of increased. Since exit probability is positively related to education, it could be that during the 2008-2009 recession more

educated managers with smaller than average sales tend to exit.

During our sample, in 2011, Japan also experienced the unprecedented strong earthquake accompanied by tsunami. We ran the same interaction regression as 3 but replacing the Recession dummy with a dummy for 2011, the year of the earthquake. This allows us to see how firm performance through this large shock relate to manager characteristics. We display the results in Table 16 and 17 for the full sample and balanced sample, respectively. Similar to the 2008-2009 recession experience, the gender gap for sales and sales per employee shrunk. The gap between migrant managers and non-migrant for sales, employment and sales per employee all shrunk. For education, the sales and employment gap shrunk while sale per employee gap increased. Unlike the recession regressions, the growth rate did gap did not shrink.

$$
\begin{aligned}
\text{Performance}_{it} &= \alpha_0 \text{FirmAge}_{it} + \alpha_1 \text{FirmAge}_{it}^2 + \text{Industry FE}_{it} + \text{Year FE}_t \\
&+ \text{Prefecture FE}_{it} + \alpha_2 \text{Dependent}_{it} + \alpha_3 \text{FamilyFirm}_{it} \\
&+ \beta_0 \text{Age}_{it} + \beta_1 \text{Age}_{it}^2 + \beta_2 \text{MALE}_{it} + \beta_3 \text{Educ}_{it} \\
&+ \beta_4 \text{Hometown}_{it} + \beta_5 \text{ExperBankruptcy}_{it} \\
&+ \gamma_0 \text{FirmAge}_{it} \text{ X Quake}_t + \gamma_1 \text{FirmAge}_{it}^2 \text{ X Quake}_t \\
&+ \delta_0 \text{Age}_{it} \text{ X Quake}_t + \delta_1 \text{Age}_{it}^2 \text{ X Quake}_t + \delta_2 \text{MALE}_{it} \text{ X Quake}_t \\
&+ \delta_3 \text{Educ}_{it} \text{ X Quake}_t + \delta_4 \text{Hometown}_{it} \text{ X Quake}_t \\
&+ \delta_5 \text{ExperBankruptcy}_{it} \text{ X Quake}_t \qquad (4)
\end{aligned}
$$

Another piece of evidence that led us to look for alternative explanations comes from a management survey. At the end of 2017, the Small and Medium Enterprise Agency contracted Accenture to conduct a management survey on a subsample of TSR firms. The managers were asked to describe various aspects of management and the condition of their firms. The surveys were collected in Dec 2017. The managers were asked to describe the conditions of their firms

Table 14: Manager characteristics and performance during 2008-2009 recession

	log Sales	Δ log Sales	ln Emp	Δ log Emp	log sales per emp	Δ ln Sales per emp
Age	0.0336***	-0.00282***	0.00452***	-0.00166***	0.0295***	-0.00105***
	(0.0012)	(0.0001)	(0.0009)	(0.0001)	(0.0007)	(0.0001)
Age^2	-0.000455***	1.26e-05***	-0.000131***	1.08e-05***	-0.000328***	8.45E-07
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00000)
Is male	0.194***	0.00808***	0.0960***	0.00374***	0.0980***	0.00432***
	(0.0087)	(0.0008)	(0.0063)	(0.0006)	(0.0053)	(0.0009)
Educ	0.114***	0.000659***	0.0771***	-0.000120*	0.0370***	0.000769***
	(0.00103)	(0.00009)	(0.00077)	(0.00006)	(0.00058)	(0.00009)
Hometown	-0.181***	-0.00400***	-0.141***	-0.00161***	-0.0406***	-0.00231***
	(0.004)	(0.000)	(0.003)	(0.000)	(0.002)	(0.000)
Experienced	0.0515*	-0.0365***	0.0641***	-0.0437***	-0.0172	0.00696*
Bankruptcy	(0.027)	(0.004)	(0.019)	(0.003)	(0.016)	(0.004)
Firm Age	0.0180***	-0.00109***	0.0222***	-0.000993***	-0.00417***	-6.33e-05**
	(0.00027)	(0.00002)	(0.00020)	(0.00002)	(0.00015)	(0.00003)
$Firm\ Age^2$	-6.52e-05***	7.10e-06***	-9.83e-05***	6.27e-06***	3.31e-05***	6.47e-07***
	(0.000002)	(0.000000)	(0.000002)	(0.000000)	(0.000001)	(0.000000)
Age X Rec	-0.00582***	-0.00123***	-0.00198***	0.00125***	-0.00402***	-0.00252***
	(0.0010)	(0.0003)	(0.0007)	(0.0002)	(0.0007)	(0.0004)
Age^2 X Rec	5.95e-05***	1.47e-05***	2.07e-05***	-9.11e-06***	4.07e-05***	2.41e-05***
	(0.000008)	(0.000003)	(0.000006)	(0.000002)	(0.000006)	(0.000003)
Is male X Rec	-0.0450***	-0.0195***	-0.0134***	0.000614	-0.0305***	-0.0199***
	(0.005)	(0.002)	(0.004)	(0.001)	(0.004)	(0.002)
Educ X Rec	0.00129**	-0.000495**	-0.000735*	-0.00110***	0.00216***	0.000537**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown X Rec	0.0294***	0.0148***	0.0197***	0.00281***	0.0109***	0.0118***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Experienced X Rec	0.0702***	-0.0727***	0.0562***	-0.0253***	8.81E-03	-0.0477***
Bankruptcy	(0.022)	(0.010)	(0.016)	(0.008)	(0.016)	(0.011)
Firm Age X Rec	-0.000262	-6.46E-05	6.46E-05	0.000102**	-0.000304***	-0.000173***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Firm\ Age^2$ X Rec	2.37e-06*	2.25e-06***	-2.67e-06***	-6.83e-07**	4.84e-06***	2.97e-06***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	5,047,701	4,267,680	5,028,127	4,381,887	5,021,410	4,237,338
R^2	0.304	0.014	0.327	0.004	0.233	0.007
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 15: Manager characteristics and performance during 2008-2009 recession, balanced sample

	log Sales	Δ log Sales	ln Emp	Δ log Emp	log sales per emp	Δ ln Sales per emp
Age	0.0393***	-0.000598***	0.0113***	-0.000613***	0.0280***	5.60E-05
	(0.0017)	(0.0001)	(0.0013)	(0.0001)	(0.0010)	(0.0002)
Age^2	-0.000482***	-2.64e-06**	-0.000179***	3.28e-06***	-0.000304***	-6.26e-06***
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00000)
Is male	0.191***	0.00866***	0.108***	0.00355***	0.0830***	0.00509***
	(0.0126)	(0.0009)	(0.0093)	(0.0007)	(0.0074)	(0.0010)
Educ	0.123***	0.000570***	0.0841***	-3.85E-05	0.0390***	0.000610***
	(0.00142)	(0.00009)	(0.00107)	(0.00007)	(0.00077)	(0.00010)
Hometown	-0.224***	-0.00456***	-0.173***	-0.00172***	-0.0517***	-0.00282***
	(0.006)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)
Experienced	0.128***	-0.0253***	0.0979***	-0.0239***	0.0315	-0.0011
Bankruptcy	(0.046)	(0.005)	(0.034)	(0.004)	(0.026)	(0.004)
Firm Age	0.0177***	-0.000546***	0.0231***	-0.000846***	-0.00537***	0.000311***
	(0.00040)	(0.00003)	(0.00030)	(0.00002)	(0.00021)	(0.00003)
Firm Age^2	-5.68e-05***	3.15e-06***	-9.98e-05***	5.12e-06***	4.26e-05***	-2.04e-06***
	(0.000003)	(0.000000)	(0.000003)	(0.000000)	(0.000002)	(0.000000)
Age X Rec	-0.0135***	-0.00176***	-0.00618***	0.000729***	-0.00727***	-0.00251***
	(0.0012)	(0.0004)	(0.0009)	(0.0003)	(0.0007)	(0.0004)
Age^2 X Rec	0.000135***	1.90e-05***	6.10e-05***	-5.46e-06**	7.36e-05***	2.45e-05***
	(0.000010)	(0.000003)	(0.000007)	(0.000002)	(0.000006)	(0.000003)
Is male X Rec	-0.0279***	-0.0179***	-0.0056	0.00136	-0.0216***	-0.0193***
	(0.006)	(0.002)	(0.004)	(0.002)	(0.004)	(0.003)
Educ X Rec	-0.00376***	-0.00121***	-0.00354***	-0.00101***	-0.000283	-0.000227
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hometown X Rec	0.0140***	0.0144***	0.0105***	0.00209***	0.00485***	0.0123***
	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Experienced X Rec	0.0486	-0.0894***	0.0313	-0.0290***	0.00598	-0.0616***
Bankruptcy	(0.032)	(0.014)	(0.022)	(0.010)	(0.021)	(0.014)
Firm Age X Rec	0.000327**	-0.000222***	0.000506***	-6.96E-05	-0.000188*	-0.000161**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm Age^2 X Rec	-1.49E-06	2.92e-06***	-5.27e-06***	4.95E-07	3.79e-06***	2.50e-06***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	3,044,463	2,745,104	3,037,707	2,735,068	3,036,654	2,733,775
R^2	0.34	0.014	0.359	0.003	0.262	0.009
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 16: Manager characteristics and performance during 2011 earthquake

	log Sales	Δ log Sales	ln Emp	Δ log Emp	log sales per emp	Δ ln Sales per emp
Age	0.0332***	-0.00314***	0.00452***	-0.00141***	0.0291***	-0.00165***
	(0.0012)	(0.0001)	(0.0009)	(0.0001)	(0.0007)	(0.0001)
Age^2	-0.000449***	1.64e-05***	-0.000130***	9.00e-06***	-0.000324***	6.73e-06***
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00000)
Is male	0.187***	0.00285***	0.0939***	0.00413***	0.0940***	-0.00125
	(0.0086)	(0.0008)	(0.0063)	(0.0006)	(0.0053)	(0.0008)
Educ	0.115***	0.000425***	0.0775***	-0.000323***	0.0372***	0.000726***
	(0.00103)	(0.00008)	(0.00077)	(0.00006)	(0.00057)	(0.00009)
Hometown	-0.176***	-0.000558	-0.138***	-0.00128***	-0.0389***	0.000786**
	(0.004)	(0.000)	(0.003)	(0.000)	(0.002)	(0.000)
Experienced	0.0702***	-0.0529***	0.0781***	-0.0477***	-0.0134	-0.00486
Bankruptcy	(0.026)	(0.004)	(0.019)	(0.003)	(0.016)	(0.004)
Firm Age	0.0179***	-0.00113***	0.0221***	-0.000995***	-0.00425***	-0.000112***
	(0.00026)	(0.00002)	(0.00020)	(0.00002)	(0.00014)	(0.00002)
$Firm\ Age^2$	-6.44e-05***	7.79e-06***	-9.85e-05***	6.28e-06***	3.40e-05***	1.36e-06***
	(0.000002)	(0.000000)	(0.000002)	(0.000000)	(0.000001)	(0.000000)
Age X Quake	-0.00740***	0.000661	-0.00385***	0.00033	-0.00380***	0.000549
	(0.0010)	(0.0004)	(0.0008)	(0.0003)	(0.0007)	(0.0005)
Age^2 X Quake	5.55e-05***	-8.13e-06**	2.75e-05***	-2.27E-06	3.02e-05***	-7.53e-06*
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00000)
Is male X Quake	-0.0263***	0.00904***	-0.0055	-0.00255	-0.0204***	0.0114***
	(0.0059)	(0.0026)	(0.0042)	(0.0018)	(0.0044)	(0.0031)
Educ X Quake	-0.00477***	0.00114***	-0.00625***	-0.000381**	0.00207***	0.00151***
	(0.0006)	(0.0003)	(0.0004)	(0.0002)	(0.0004)	(0.0003)
Hometown X Quake	0.0120***	-0.00203*	0.00739***	0.00251***	0.00475**	-0.00460***
	(0.0027)	(0.0012)	(0.0020)	(0.0008)	(0.0019)	(0.0014)
Experienced X Quake	-0.0404*	0.000219	-0.0223	-0.0153	-1.92E-02	0.00982
Bankruptcy	(0.0230)	(0.0130)	(0.0166)	(0.0095)	(0.0167)	(0.0153)
Firm Age X Quake	0.000596***	0.000377***	0.000275**	0.000224***	0.000284**	0.000180**
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$Firm\ Age^2$ X Quake	-4.27e-06***	-2.74e-06***	-3.44e-06***	-1.53e-06***	-6.79E-07	-1.43e-06**
	(0.000001)	(0.000001)	(0.000001)	(0.000000)	(0.000001)	(0.000001)
N	5,047,701	4,267,680	5,028,127	4,381,887	5,021,410	4,237,338
R^2	0.304	0.014	0.327	0.004	0.233	0.007
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 17: Manager characteristics and performance during 2011 earthquake, balanced sample

	log Sales	Δ log Sales	ln Emp	Δ log Emp	log sales per emp	Δ ln Sales per emp
Age	0.0384***	-0.000926***	0.0111***	-0.000498***	0.0274***	-0.000396***
	(0.0017)	(0.0001)	(0.0013)	(0.0001)	(0.0010)	(0.0001)
Age^2	-0.000470***	1.14E-06	-0.000174***	2.40e-06***	-0.000297***	-1.54E-06
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00000)
Is male	0.187***	0.00394***	0.107***	0.00350***	0.0804***	0.000349
	(0.0125)	(0.0009)	(0.0093)	(0.0007)	(0.0074)	(0.0009)
Educ	0.123***	0.000180**	0.0841***	-0.000216***	0.0389***	0.000391***
	(0.00141)	(0.00009)	(0.00107)	(0.00007)	(0.00076)	(0.00009)
Hometown	-0.224***	-0.00134***	-0.172***	-0.00147***	-0.0516***	0.00015
	(0.006)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)
Experienced	0.138***	-0.0457***	0.105***	-0.0301***	0.0329	-0.0162***
Bankruptcy	(0.046)	(0.005)	(0.034)	(0.004)	(0.027)	(0.004)
Firm Age	0.0178***	-0.000614***	0.0232***	-0.000886***	-0.00539***	0.000281***
	(0.00040)	(0.00002)	(0.00030)	(0.00002)	(0.00021)	(0.00003)
$Firm\ Age^2$	-5.75e-05***	3.92e-06***	-0.000101***	5.40e-06***	4.31e-05***	-1.53e-06***
	(0.000003)	(0.000000)	(0.000003)	(0.000000)	(0.000002)	(0.000000)
Age X Quake	-0.0154***	0.000337	-0.00888***	0.000506	-0.00652***	-1.38E-04
	(0.0012)	(0.0005)	(0.0009)	(0.0003)	(0.0008)	(0.0006)
Age^2 X Quake	0.000123***	-4.99E-06	6.78e-05***	-3.67E-06	5.55e-05***	-1.51E-06
	(0.00001)	(0.00000)	(0.00001)	(0.00000)	(0.00001)	(0.00001)
Is male X Quake	-0.0173***	0.00894***	0.0016	0.00307	-0.0172***	0.00626*
	(0.0057)	(0.0031)	(0.0044)	(0.0022)	(0.0043)	(0.0037)
Educ X Quake	-0.00603***	0.00121***	-0.00701***	-0.000363*	0.00104***	0.00158***
	(0.0006)	(0.0003)	(0.0004)	(0.0002)	(0.0004)	(0.0004)
Hometown X Quake	0.0204***	-0.00185	0.0135***	0.00181*	0.00811***	-0.00365**
	(0.0027)	(0.0014)	(0.0022)	(0.0010)	(0.0018)	(0.0016)
Experienced X Quake	-0.00589	0.018	-0.00826	0.00197	-3.35E-03	0.0215
Bankruptcy	(0.0283)	(0.0181)	(0.0205)	(0.0112)	(0.0197)	(0.0200)
Firm Age X Quake	-0.000343**	0.000335***	-0.000435***	0.000233***	9.58E-05	9.84E-05
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$Firm\ Age^2$ X Quake	2.59e-06**	-2.66e-06***	2.01e-06**	-1.60e-06***	4.09E-07	-1.06E-06
	(0.000001)	(0.000001)	(0.000001)	(0.000000)	(0.000001)	(0.000001)
N	3,044,463	2,745,104	3,037,707	2,735,068	3,036,654	2,733,775
R^2	0.34	0.014	0.359	0.003	0.262	0.009
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses.
*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

for the end of October 2017. We use this information as a second sample to check the analysis in the previous section. First, we checked if the relationship between firm performance and managers characteristics is similar in the management survey sample and our main sample. Table 18 displays the regression results. Many coefficients are not significant because the survey sample is much smaller. Nonetheless, the signs on the coefficients are broadly in line with our regression 1 and 3 results. For example, firm performance has an inverted-U shape with respect to managers age. Male managed firms tend to be bigger, although this is not significant because 97% of the survey sample has male owner. The small sample of the survey limits its usefulness but we find it reassuring that using the sample selected by the survey yields similar finding to our regression with the entire database.

The survey allows us to control for some unobserved ability or experience and preference. Specifically, we control for growth preference by using the answer to the question which asks *In term of adding workers or expanding sales, please pick the option that is the closest to your view of your firm's growth* (authors' translation). The options are 1) want to achieve high growth in a short amount of time; 2) want to take time to achieve stable growth; 3) do not care about growth, want to maintain status quo; 4) the firm is weakening, it may be difficult to maintain status quo.

We construct a desire to grow variable which is five minus the number assigned to each choice. So the first choice is assigned 4 and the last choice is assigned 1. We interpret a higher desire to grow variable as the manager having stronger preference for fast growth. We add the desire to grow variable in our regression. The second, fifth and eighth columns of Table 18 shows that controlling for growth preference reduces the coefficients on manager characteristics only slightly. It is also reassuring that the managers who answer higher desire to grow tend to have larger firms and higher labor revenue productivity.

The fourth, seventh and last columns of Table 18 add controls for managers experience. Namely, we add a dummy for managers who are founders, dummy

for less than 10 years experience as the manager, work experience in the other firms of the same business, in large firms, in financial firms and in locations outside of Japan. Again, controlling for these only reduces the coefficients on the manager's characteristics slightly.

5.1. Manager characteristics and volatility

Currently, we are in the process of testing risk preference as an alternative explanation. If risk preference explains why some manager characteristics are associated with smaller sales or employment, we expect these characteristics to also be associated with smaller volatility in performance. We investigated this using two approaches. In the first approach, we divided our data into subsamples of year X 2-digit industry X firm prefecture X firm age quantile X independent dummy X family firms dummy. This gave us approximately 400,000 cells. Within each cell, we divided the firms by one manager characteristics, for example, male managed vs female managed firms. Then we calculated the dispersion of employment, sales, sales per employee and their growth rates. We regressed the dispersion measure on the manager characteristics to see whether dispersion is systematically related to the characteristics after controlling for the above firm characteristics. In the second approach, we calculated the dispersion of employment, sales, sales per employee and their growth rate over the life time of each firm in the data and regressed this on all of the manager characteristics. A small fraction of our firms experience change in managers. To control for manager characteristics, we drop these firms. For the remaining firms who have the same manager throughout the sample, we use the manager's characteristics at the beginning of the sample, in particular, manager and firm age at the beginning of the sample.

Table 19 shows that older managers tend to have more dispersed size but less dispersed growth rates. Dispersion of both levels and growth rates is smaller for firms managed by managers who are from the same location. Male man-

agers tend to have more dispersed sales, employment, sales per employee and the growth rate of employees but less dispersed growth rate of sales and sales per employee. The relationship between education, bankruptcy experience and dispersion is also mixed.

In Table 19, we did not control for manager characteristics simultaneously, which could explain the mixed results for some characteristics. In Table 20 we calculated dispersion of level and growth rates over of a firm's lifetime and regress this on all of the manager characteristics. Here we find within firm volatility has an U-shaped relationship with manager's age and firm age. While not all coefficients are significant, male and more educated managers tend to have more volatility. Similar to the cross-sectional dispersion results, non-migrant managers have lower volatility while managers who have experienced bankruptcy is associated with higher volatility.

6. Conclusions

In this paper, we use a large dataset of public and private firms in Japan to examine the relationship between firm performance and manager characteristics. We find manager characteristics have predictive power for firm performance even after controlling for many firm characteristics. We conjecture that variation in the risk preference of managers may be one of important drivers of these findings.

We also document several demographics trends of managers: 1) aging 2) rising share of female managers 3) rising migration rate 4) rising education attainment. For future research, we plan to investigate the effect of such demographics shifts of managers on aggregate productivity, output and employment in Japan.

Table 18: Results from management survey data

	log Sales			log Emp			log Sales per Emp		
Age	0.0826***	0.0852***	0.103***	0.0293*	0.0308*	0.0395**	0.0525***	0.0537***	0.0630***
	(0.026)	(0.026)	(0.029)	(0.018)	(0.018)	(0.020)	(0.019)	(0.019)	(0.021)
Age^2	-0.000722***	-0.000736***	-0.000891***	-0.00025	-0.000257*	-0.000336*	-0.000466***	-0.000474***	-0.000544***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Is male	-0.1	-0.107	0.00786	0.023	0.0171	0.0752	-0.125	-0.126	-0.0737
	(0.179)	(0.182)	(0.196)	(0.106)	(0.109)	(0.121)	(0.122)	(0.123)	(0.129)
College	0.154**	0.147**	0.119*	0.138***	0.135***	0.121**	0.0193	0.0157	0.0015
	(0.061)	(0.061)	(0.068)	(0.046)	(0.045)	(0.052)	(0.043)	(0.043)	(0.048)
Hometown	-0.0825	-0.0776	-0.0503	-0.0249	-0.024	-0.0193	-0.0574	-0.054	-0.0319
	(0.060)	(0.059)	(0.068)	(0.046)	(0.046)	(0.052)	(0.042)	(0.042)	(0.049)
Experienced	-0.883***	-0.887***	-0.815**	-0.299	-0.293	-0.0678	-0.581***	-0.591***	-0.751**
Bankruptcy	(0.254)	(0.262)	(0.407)	(0.215)	(0.248)	(0.366)	(0.213)	(0.201)	(0.318)
Firm age	0.00800**	0.00938***	0.00648	0.00481*	0.00592**	0.00486	0.00301	0.00336	0.00112
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Firm age^2	-1.23E-06	-6.65E-06	1.45E-05	-5.36E-06	-9.79E-06	3.35E-06	4.82E-06	3.08E-06	1.48E-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D1growwill		-1.85E-01	-0.214		-0.0352	0.109		-0.147	-0.316*
		(0.221)	(0.245)		(0.145)	(0.154)		(0.162)	(0.167)
D2growwill		-0.486***	-0.457***		-0.387***	-0.325***		-0.0961	-0.129
		(0.100)	(0.110)		(0.075)	(0.081)		(0.072)	(0.079)
D3growwill		-0.127	-0.109		-0.141**	-0.0839		0.0137	-0.0213
		(0.088)	(0.095)		(0.066)	(0.070)		(0.062)	(0.068)
N	1,622	1,622	1,338	1,634	1,634	1,347	1,614	1,614	1,333
R^2	0.371	0.385	0.412	0.205	0.222	0.246	0.472	0.475	0.497
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Dependent	YES	NO	NO	YES	NO	NO	YES	NO	NO
Experience	NO	NO	YES	NO	NO	YES	NO	NO	YES
Founder	NO	NO	YES	NO	NO	YES	NO	NO	YES

This table displays the results from an OLS regression. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

References

Acemoglu, Daron and Pascual Restrepo, "Secular stagnation? The effect of aging on economic growth in the age of automation," *American Economic Review*, 2017, *107* (5), 174–79.

Bartelsman, Eric, John Haltiwanger, and Stefano Scarpetta, "Cross-Country Differences in Productivity: The Role of Allocation and Selection," *American Economic Review*, February 2013, *103* (1), 305–34.

Bernard, Andrew B, Andreas Moxnes, and Yukiko U Saito, "Production networks, geography and firm performance," *Quarterly Journal of Economics*, forthcoming.

Bertrand, Marianne and Antoinette Schoar, "Managing with style: The effect of managers on firm policies," *Quarterly Journal of Economics*, 2003, *118* (4), 1169–1208.

Bloom, Nicholas and John Van Reenen, "Measuring and explaining management practices across firms and countries," *The Quarterly Journal of Economics*, 2007, *122* (4), 1351–1408.

_ and _ , "Why do management practices differ across firms and countries?," *Journal of economic perspectives*, 2010, *24* (1), 203–24.

_ , Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts, "Does management matter? Evidence from India," *The Quarterly Journal of Economics*, 2013, *128* (1), 1–51.

Engbom, Niklas, "Firm and Worker Dynamics in an Aging Labor Market," Technical Report, Working Paper 2017.

Feyrer, James, "The US productivity slowdown, the baby boom, and management quality," *Journal of Population Economics*, Jan 2011, *24* (1), 267–284.

Table 19: Cross-section volatility and manager characteristics

	sd(log Sales)	sd(Δ log Sales)	sd(ln Emp)	sd(Δ log Emp)	sd(log sales per emp)	sd(Δ ln Sales per emp
Age Quantile 2	0.0458***	-0.00691***	0.0431***	-0.00960***	0.0101***	-0.00941***
	(0.0037)	(0.0011)	(0.0030)	(0.0009)	(0.0022)	(0.0012)
Age Quantile 3	0.0675***	-0.00595***	0.0330***	-0.0188***	0.0188***	-0.0129***
	(0.0038)	(0.0011)	(0.0031)	(0.0010)	(0.0023)	(0.0013)
Age Quantile 4	0.0535***	-0.000892	-0.0118***	-0.0249***	0.0488***	-0.00830***
	(0.0039)	(0.0011)	(0.0032)	(0.0010)	(0.0024)	(0.0013)
Is male	0.175***	-0.0306***	0.210***	0.00862***	0.0136***	-0.0295***
	(0.0051)	(0.0015)	(0.0041)	(0.0013)	(0.0031)	(0.0017)
hometown	-0.0266***	-0.0116***	-0.0270***	-0.00317***	-0.0208***	-0.0115***
	(0.0030)	(0.0009)	(0.0024)	(0.0008)	(0.0018)	(0.0010)
Educ level 2	-0.0718***	0.00683***	-0.0800***	-0.0128***	-0.0334***	0.0013
	(0.0048)	(0.0014)	(0.0038)	(0.0012)	(0.0029)	(0.0016)
Educ level 3	0.0952***	-0.0281***	0.116***	-0.00826***	-0.0161***	-0.0325***
	(0.0034)	(0.0009)	(0.0027)	(0.0009)	(0.0020)	(0.0011)
Educ level 4	0.231***	-0.0266***	0.237***	-0.0250***	-0.0978***	-0.0449***
	(0.0182)	(0.0050)	(0.0146)	(0.0045)	(0.0109)	(0.0058)
Experienced	-0.294***	0.108***	-0.284***	0.0196***	-0.130***	0.0917***
Bankruptcy	(0.0280)	(0.0080)	(0.0227)	(0.0072)	(0.0170)	(0.0092)

This table displays the results from regressing cross-sectional dispersion (year X 2-digit industry X firm prefecture X firm age quantile X independent dummy X family firms dummy) cells on each manager characteristics without controlling for other manager characteristics. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Table 20: Within-firm volatility and manager characteristics

	sd(log Sales)	sd(Δ log Sales)	sd(ln Emp)	sd(Δ log Emp)	sd(log sales per emp)	sd(Δ ln Sales per emp
Age	-0.00769***	-0.00394***	-0.00420***	-0.00425***	-0.00532***	-0.00500***
	(0.00040)	(0.00039)	(0.00032)	(0.00030)	(0.00039)	(0.00043)
Age^2	7.74e-05***	4.42e-05***	2.41e-05***	2.90e-05***	5.40e-05***	5.01e-05***
	(0.000004)	(0.000004)	(0.000003)	(0.000003)	(0.000004)	(0.000004)
Is male	0.000565	0.00118	0.00770***	0.00489***	0.00111	0.00421*
	(0.00212)	(0.00208)	(0.00163)	(0.00157)	(0.00212)	(0.00234)
Educ	0.000327	0.000611***	0.00173***	0.000845***	-0.00104***	0.000142
	(0.00023)	(0.00022)	(0.00018)	(0.00017)	(0.00022)	(0.00025)
Hometown	-0.00458***	-0.00597***	-0.00361***	-0.00419***	-0.00445***	-0.00667***
	(0.00098)	(0.00097)	(0.00078)	(0.00075)	(0.00098)	(0.00110)
Experienced	0.0574***	0.0545***	0.0599***	0.0570***	0.0729***	0.0813***
Bankruptcy	(0.00998)	(0.01040)	(0.00776)	(0.00785)	(0.01010)	(0.01210)
Firm age	-0.00261***	-0.00236***	-0.00127***	-0.00125***	-0.00265***	-0.00276***
	(0.000056)	(0.000055)	(0.000045)	(0.000043)	(0.000055)	(0.000063)
Firm age^2	1.78e-05***	1.56e-05***	9.06e-06***	8.30e-06***	1.69e-05***	1.78e-05***
	(0.0000005)	(0.0000005)	(0.0000004)	(0.0000004)	(0.0000005)	(0.0000006)
N	453,495	413,479	452,573	420,984	452,060	411,912
R^2	0.075	0.139	0.03	0.029	0.073	0.109
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm loc FE	YES	YES	YES	YES	YES	YES
Dependent	YES	YES	YES	YES	YES	YES

This table displays the results from regressing within firm dispersion on all manager characteristics. Robust standard errors in parentheses. *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.

Fukao, Kyoji and Hyeog Ug Kwon, "WHY DID JAPAN'S TFP GROWTH SLOW DOWN IN THE LOST DECADE? AN EMPIRICAL ANALYSIS BASED ON FIRM-LEVEL DATA OF MANUFACTURING FIRMS," *Japanese Economic Review*, 2006, *57* (2), 195–228.

Gabaix, Xavier and Augustin Landier, "Why has CEO pay increased so much?," *Quarterly Journal of Economics*, 2008, *123* (1), 49–100.

Hsieh, Chang-Tai and Peter J Klenow, "Misallocation and manufacturing TFP in China and India," *The Quarterly journal of economics*, 2009, *124* (4), 1403–1448.

Syverson, Chad, "Product substitutability and productivity dispersion," *Review of Economics and Statistics*, 2004, *86* (2), 534–550.

A Data

A1. TSR

Table A.1: Number of firms by year (raw data)

Year	Number of firms
2006	1,138,033
2007	1,150,311
2008	1,168,939
2009	1,223,477
2010	1,300,639
2011	1,335,421
2012	1,395,009
2013	1,456,276
2014	1,480,625
2015	1,493,076
2016	1,499,283

Tabulated at the end of September

A2. Definition of a "manager"

In the TSR data, we observe the characteristics of "daihyousha. This is mostly "daihyoutorishimayaku, which is sometimes translated into English as "representative directors". In Japanese corporation law, "daihyoutorishimayaku" is someone within the company who can make decisions for the company and legally represent the company. For example, contracts a company makes must be signed by the "daihyoutorishimayaku" of the company. A single company has one "daihyoutorishimayaku", in principle, but, some companies, especially

large companies, may have multiple “daihyoutorishimayaku”. For example, Toyota has three “daihyoutorishimayaku”: the chair and vice chair of the Board of directors and the President. The owner of the company in our data is not necessarily the “daihyousha”. According to our conversation with TSR, they survey the “daihyousha” with the highest authority. Hence a change in “daihyousha” is a change in the management structure of the company. We translate “daihyousha” as manager, following the tradition of the management literature. We use “manager” a catch-all phrase for someone who makes decisions of a company.

Table A.2 gives a breakdown of the titles of the “daihyousha”. The title of the “daihyousha” depends on the legal organization of the company. 代表取締役 are for corporations (kabushikikaisha, yugenkaishai, sogokaisha).代表執行役 is for kabushikikaisha. 理事長 is for kumiai and houjin. 無限責任社員 is for goushikaisha. 代表社員 is for goumeikaisha. 経営者 is for non-incorporated entities. 93% of our firm-years come from non-incorporated, kabushikikaisha, and yugenkaisha.

Table A.2: Titles of “daihyousha”

Title	Tranlation	Number of firms-year	%
代表取締役	Representative director	11,600,741	79.23
代表執行役	Representative Executive Officer	3,572	0.02
代表社員	Representative employee	44,982	0.31
無限責任社員	Employee with unlimited liability	61,914	0.42
理事長	President	1,087,417	7.43
経営者	Manager	1,842,460	12.58

Tabulated at the end of September

B Appendix tables

Table B.3: Means and standard deviations of key variables

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
log sales	11.97	1.75	Firm Age	41.8	22.8
log emp	2.10	1.33	CEOchange	0.026	0.161
log sales per employee	9.878	0.996	CEOeduLH	0.004	0.065
Δ log sales	-0.021	0.320	CEOeduHL	0.002	0.040
Δ log emp	-0.006	0.221	CEOeduLL	0.006	0.077
Δ log sales per employee	-0.016	0.366	CEOeduHH	0.011	0.103
TSR Score	48.6	6.0	CEOsexMF	0.001	0.031
Dclose	0.006	0.076	CEOsexFM	0.001	0.029
Dbankrupt	0.002	0.044	CEOsexMM	0.024	0.154
Dependent	0.100	0.301	CEOsexFF	0.000	0.021
Dunlisted	0.994	0.080	CEOageYO	0.001	0.027
Dfam1	0.860	0.347	CEOageOY	0.008	0.089
Dfam0	0.065	0.247	CEOageYY	0.001	0.038
CEO Age	60.7	10.6	CEOageOO	0.014	0.119
Is male	0.960	0.196	CEOhometown01	0.003	0.057
Education years	14.1	1.9	CEOhometown10	0.002	0.050
Hometown	0.719	0.450	CEOhometown11	0.012	0.111
Experienced Bankruptcy	0.003	0.056	CEOhometown00	0.008	0.090

Figure B.1: Sales, growth of sales and age profile

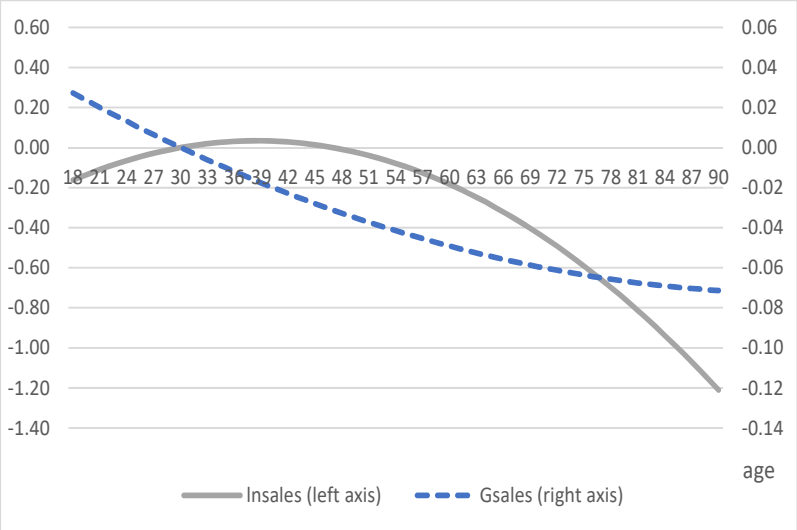


Figure B.2: Average sales, growth of average sales and age profile

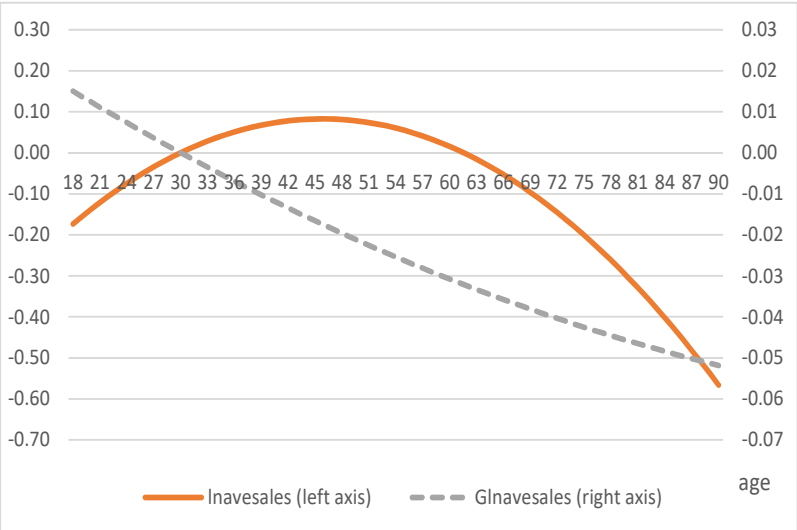


Figure B.3: Employment, growth of employment and age profile