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# Population Aging and Small Business Dynamics

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## Population Aging and Small Business Dynamics \*

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### Abstract

This paper uses a large sample of small and medium-sized enterprise financial data (2008-2019) to empirically analyze the effect of a prefecture's population aging on successions, mergers, suspensions/closures, and bankruptcies. The higher the proportion of the population aged 65 and over, the more serious the problem of finding successors for small businesses, that is, the decline in the turnover of aged business owners occurring through succession. Compared to inherited small and medium-sized enterprises, bankrupt enterprises, closed enterprises, and acquired enterprises tend to suffer from poor performance and sales. Companies that suffer from sluggish sales or poor performance go bankrupt, close, or merge; in other words, the metabolism of small and medium-sized enterprises also slow down as the population ages, not only impeding small business metabolism, but also performance—profitability, investment and growth rates—decline with increases in the population aged 65 and older. On the other hand, cash holdings of small businesses increase with population aging, likely because of increases in precautionary liquidity demand in preparation for future business closures.

Key words: population aging, small business dynamics, succession, bankruptcy, closure, acquisition  
JEL Classifications D22 G31 G32 G33

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## **1. Introduction**

Japan has been experiencing substantial growth in the size of their older population due to historically low fertility. Aging and low fertility directly reduces the size of labor force. Not only the size of labor force, but population aging can also have a significant adverse impact on productivity, economic growth, consumption growth, investment, and entrepreneurship. The lack of entrepreneurship implies difficulties in transforming outcomes of innovation to the economy by launching new businesses. Exiting and entering firms significantly contribute to aggregate productivity but Japan has very low entry rate as well as low exit rate in comparison with other major OECD countries.

In this paper, we link population aging degrees that vary across prefectures to the outcomes of small business entrepreneurial exit including successions, acquisitions, closures, and bankruptcies. Outcomes of exit can be the entrepreneur's personal exit from a firm and the exit of the firm from the market (Wennberg and DeTienne, 2014). Conventionally, an insolvent firm is forced to exit. As results of insolvency, the CEO exits business, and the business exits the market. In voluntary exit, the CEO of a solvent firm exits business, and the business is closed. Acquisition means a CEO exits business and the firm is acquired. Most small and medium sized enterprises are family businesses. A family member takes over the business and the incumbent CEO exits. Succeeding a firm requires business skills. However, aging blocks younger people from acquiring business skills (Liang, et al., 2018) and skilled youngers who are suitable to succeed decrease with population aging. Consequently, population aging might increase difficulties of succession. Limited to our knowledge, this paper is the first to link population aging to successions of small businesses.

Different from starting businesses, successful successions depend greatly on child relationships, required knowledge acquisition of younger family members, and the level of risk orientation of younger family members (Cater and Justis, 2009). If population aging hinders

younger generation to acquire business skills, it is more difficult for aging owners to seek qualified someone of the family in a aging society. On the other hand, none of the younger family members choose to succeed the family business if all recognize lack of required business skills. Additionally, younger generations may dislike succeeding less profitable firms, firms with sluggish sales, risky firms in terms of both size and leverage. Successions are resource allocation of scarce youngers with business skills in a aging society. We shed new light to this issue.

An aging entrepreneur who fails to seek a successor needs to exit in the future upon retirement. The entrepreneur may sell the firm. The businesses of the acquired firm are wholly or partially persevered, but the entrepreneur exits the firm. Also, acquisitions reallocate resources including organizational capabilities from underperforming firms to outperforming firms. Also, acquisitions play important roles in improving productivity for synergy. For owners of underperforming small firms, seeking acquisition can be a strategy of flight from losses. In family business research, strategies for exiting by business sales and by succession differs greatly (Wennberg, Hellerstedt, Wiklund, and Nordqvist, 2011).

The M&A market plays a significant role in matching potential acquirers and exiting CEOs facing difficulties of business succession. Japan has been experiencing increases of M&As for business succession (the 2020 White Paper on Small and Medium Enterprises by the Small and Medium Enterprise Agency, the White paper hereafter). More importantly, through acquisitions businesses are succeeded by the acquirers and it is less likely to be constrained by the declining supply of youngers with business skills due to slow business skill formation attributed to population aging. Japan have been opting to acquire other small companies rather than invest in expanding production capacity.

However, expensive legal and accounting advice service and financial brokage service fees are not affordable for a small or micro firm even it is profitable. Such small or micro firms without a successor may choose voluntary exit if they can repay outstanding debts. Closing a firm is not necessarily to destroy the business. The redeployment of resources of closed firms suggests that

employees, long-term relationships, and facilities are mainly succeeded by the suppliers, the customers, or the close industrial peers (The 2019 White Paper). It is not surprising that potential acquirers of small firms are limited to close business partners and acquaintances of industrial peers, because small firms are less notable and less transparent than medium-sized firms. We need more tracking down investigations of the redeployment of closed firms.

In previous studies, exit strategies by selling business sales differs from exiting strategies by passing business on to younger generation. Likewise, strategies for exiting by closing business sales may greatly differ from exiting strategies by passing business on to younger generation. It is even worse that the aging owners of small firms without a successor lack exiting plans (Dahl, 2005). Without no doubts, for closing the business smoothly at the future retirement time, an elderly owner without a successor needs carefully manage financial risks such as scaling back, holding more cash. Accordingly, executing strategies for exiting by closing businesses affects firm performance in an aging society.

Using a large sample of financial data of small and medium-sized enterprises, we find population aging lowers the succession likelihoods of small construction companies, small wholesale companies. Also, the size difference of succession likelihood increases with population aging. More importantly, succession likelihoods increase with profitability, net wealth, firm size, decent sales in comparison with business closure. In other words, children choose not to succeed their parent's unsuccessful businesses. In this sense, business succession is an early stage of natural selection. Entrepreneurs without a qualified successor need to schedule their exit in the future: seeking acquisition or closing firms.

Conventionally, exit was seen as failure. Underperforming firms need reshape businesses to regain profitability, firms facing losses will downsize to eliminate losses, and economically distressed firms will cease entire production. Particularly, insolvent firms need to restructure debts as well as businesses. Our findings suggest that voluntary exit is a route to eliminate unsuccessful firms as well as bankruptcy. An acquired underperforming firm remains the market, but the

incompetent CEO is gone out of business. In sum, bankruptcies, voluntary exits, acquisitions are mainly driven by failure.

Japan has been experiencing low entry rate as well as low exit rate. This study is the first to link population aging to entrepreneurial exit. We find that population aging hinders bankruptcy, voluntary exit, and acquisition. In other words, population aging lowers corporate metabolism. Directly, more underperforming firms are not weeded out but remain as population aging hindering bankruptcy and voluntary exit. Also, incompetent CEOs remain if acquisition decreases with population aging. Business succession replaces an aging CEO with a younger with more energy and creativity. Potentially, a young successor is more likely to bring changes. Moreover, an aging CEO without a successor needs to conservatively operate business for smooth business closure at the future retirement time. For instance, a small firm lacking for a successor, scales back and the business is more likely to remain sluggish.

For above reasons, population aging impedes economic metabolism, and this consequently lowers firm performance. To investigate the effect of population on performance of small and medium sized enterprises, we regress firm performance on population aging. We find that population aging is a driver of poor profitability, low investment, and low growth of small firms as well as size disparity of performance. In previous studies, regional population is negatively related to regional economic growth. We provide new evidence that regional population aging lowers the performance of regional firms. Moreover, cash holdings increase with population aging. This might suggest that in an aging society more small firms execute exit strategies by closing businesses to hold more cash.

Suggestive evidence shows that a firm's age is less likely to be 5 year or younger in an aging prefecture than in a young prefecture. This is consistent with Liang et al. (2018). As for CEO aging, population aging increase CEO age of small companies. The difference of CEO age in firm size increases with population aging. In short, CEO aging driven by population aging is a phenomenon in small firms. To assess the effects of delayed retirement due to the recent pension

reform, we include year dummies in regressions.

Different from previous studies on small business CEO aging, small business succession, and small business exit, we estimate the effect of prefecture population aging—measured as the older population share—on successions, exit and acquisitions of individual small and medium-sized enterprises. State-based designs have been employed to link state population aging to state economic growth (Maestas, et al., 2023). To capture the effects of prefecture economic growth that can affect its age structure by influencing migration and mortality, we control for prefecture economic growth in estimation. Also, we control for the diffusion index of short term borrowing for small business to assess uniform monetary policy responses.

Prefecture-based research designs offer some advantages over cross-country designs. First, cross-country research is constrained for availability of comparable data on successions. In comparison with international entrepreneurial comparative studies using the Global Entrepreneurship Monitor database, research on secession is limited to firm level data in a specific country. Also, cross-country studies are vulnerable to bias from unobserved heterogeneity in pension systems, immigration policies, bankruptcy laws, inheritance tax systems, and cultural norms (Maestas, et al., 2023). More importantly, it is the first to estimate all adverse effects of population aging that vary across prefecture, such as aging-induced reductions in the business startup rate and other aging-induced impeded metabolism including succession, closure, acquisition, and bankruptcy.

The remaining of the paper is organized as follows. In Section 2, we review literature on entrepreneurial exit routes and develop hypothesis. Section 3 describes data and section 4 illustrates empirical results. We conclude in section 5.

## **2. Literature Review**

Recently, quite a few small firms are not succeeded and ultimately such firms are closed due to population aging. Tsuruta (2021) shows that smaller, younger, highly leveraged, and low

growing firms less likely to have a successor, and an elderly CEO lack of a successor is more likely to close the business or go bankrupt subsequently. In Cater and Justis (2009), strategies for passing on a firm to a family member depends on non-financial issues such as child relationships.

As an alternative of succession, strategies for exiting by selling the firm differ greatly from strategies passing it on to a family member (Wennberg, Hellerstedt, Wiklund, and Nordqvist, 2011). In Van Witteloostuijn (1998), seeking acquisition by an unprofitable firm is also flight from losses and this is a failure-avoidance strategy to avoid the worst situation such as bankruptcy. M&A plays an important role in reallocating resources from a target to its acquirer. Acquirers are more productive than targets and acquirers retain more productive acquired plants and sell less productive acquired ones (Maksimovic, Phillips, and Prabhala, 2011). Fortune and Mitchell (2012) address acquisitions retain organizational capabilities of struggling firms within markets and thus exit by acquisition represents firm selection but capability adaptation. Balcaen, et al. (2012) show 14% of economically distressed firms in Belgium are acquired, merged, or split.

If the potential net proceed from acquisition price minus commissions is not lucrative, a firm can choose voluntary liquidation. In Fleming and Moon (2009), listed firms exited via voluntary liquidation have low asset productivity and low market-to-book ratios but more cash. High inside ownership, takeover pressure and low leverage suggest proper incentives of the managers of liquidating firms. 44% of economically distressed firms are voluntarily liquidated in Balcaen, et al. (2011). Resources such as assets of liquidated listed firms are redeployed for more productive uses (Fleming and Moon, 2009). An aging owner may simply close business once it has served its purpose to supplement income (Folta, Delmar, and Wennberg, 2010; Kunkle, 2001).

Since an early study by Schary (1991), several studies have distinguished between exit routes (Dimara et al., 2008; Bruyaka and Durand, 2012; Weterings and Marsili, 2015; Fortune and Mitchell, 2012; Cefis and Marsili, 2012; Bhattacharjee et al., 2009; Goktan et al., 2018; Balcaen et al., 2012; Ponikvar et al., 2018). Firm characteristics and CEOs' demographic characteristics such as size, leverage, performance, liquidity, innovative capabilities, firm ages, and CEO ages



influence exit routes. Wennberg and DeTienne (2014) provide a conceptual model to distinguish between outcomes of exit at individual level and firm level. Quite a few entrepreneurs may exit the firm and leave the firm to someone of the family. Business sales are alternative business successions. Small firms without a successor may ultimately close businesses voluntary. Of course, acquisitions and voluntary exits are not necessarily to be related to succession.

Different from successions, sales and closures, bankruptcies are viewed as forced reorganization or exit triggered by insolvency. It is necessary to shift the control right from the owner of a small firm to the creditors to alleviate conflicts between the owner and the creditors (Aghion and Bolton; 1992). In practice, businesses of bankrupt firms may remain. Bankruptcy is a legal form to remove the control right from the CEO of an insolvent firm. Sweden, majority of bankrupt firms are sold as a going concern in bankruptcy auction (Thorborn, 2000). Under the U.S. Bankruptcy Code, the Chapter 11 provide a legal procedure for reorganization and the Chapter 7 provide a legal procedure for liquidation. Lemmon, et al. (2009) show the Chapter 11 procedure preserves the going concern value of financially distressed but economically viable firms while selling the assets of economically distressed firms.

The incumbent CEO is not necessarily to leave. The Chapter 11 of U.S. bankruptcy code is a debtor-in-possession procedure which allows managers to keep a certain degree of control over the bankrupt firm's assets and operations. Under Swedish Automatic Bankruptcy Auction system, owner-managers of larger private firms may use a prepack auction to maintain control benefits and to enhance their market value as managers with the new owners (Thorburn,2000). Nonetheless, Bankruptcy is costly, and CEOs of bankrupt firms suffer large income losses relative to non-bankrupt CEOs (Eckbo and Thorburn, 2003).

In Japan, an insolvent firm can choose a legal liquidation procedure under the Bankruptcy Act (Hasan., or a legal rehabilitation procedure under the Civil Rehabilitation Act (Minji Saisei), or a

legal corporate reorganization under the Corporate Reorganization Act (Kaisha Kousei)<sup>1</sup>. Several reasons can be responsible for downsizing or exit such as poor management capabilities, or lower labor productivities, or increasing competition by new entries following deregulations or technological changes, or consecutive declines in demand, or unexpected shocks such as a financial crisis or a pandemic that dramatically triggers declines in sales and profitability.

Recently, TSR has reported that out of the companies that applied for civil rehabilitation, about 70% were not successful. The breakdown is as follows: 3.6% M&A, 11.9% dissolutions, 36.6% subsequent bankruptcies, 0.6% special liquidations, and 47.1% closings or unknown. Eventually, about 70% of civil rehabilitation firms were forced to close business as bankrupt firms. This suggests that finally most rehabilitation firms were eliminated as bankrupt firms. Bankruptcy is harsh and painful. The CEO of a bankrupt small and medium-sized firm lose most personal wealth. Of course, a bankrupt firm is not able to pass on the company to a family member. Thus, it is less likely for a small firm without a successor to strategically exit by filing for bankruptcy.

Japan has very low exit rate as well as low entry rate in comparison with other major OECD countries. Investigating the effect of population aging on successions as well as exit including business closures has emerged as an important issue. Previous studies find that population aging on entrepreneurship using cross country data (Liang et al., 2018). Like starting businesses, succeeding businesses requires business acumen. Population aging delays acquisition of required

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<sup>1</sup> The Corporate Reorganization Act was enacted in 1952 to transplant Corporate Reorganization under Chapter X of the U.S. National Bankruptcy Act of 1938, known as Chandler Act. Reform Act of 1978, Chapter X and Chapter XI of Chandler Act were combined into a single Chapter 11 of the modern U.S. Bankruptcy Code. Conventionally, the Corporate Reorganization Act has been mainly used by large, listed firms, whereas most small firms file for liquidation under the Bankruptcy Law. Japan launched the Civil Rehabilitation Act in 2000 to provide a debtor-in-possession rehabilitation procedure for small firms in response to increasing corporate bankruptcies since the late 1990s. Meanwhile, the Composition (Wagi. Act was abolished. Till 1999, the Composition Act provided a quasi-legal procedure for insolvent small firms to restructure debt and business. The Composition Law required a composition debtor to submit the composition plan together with a composition petition, and security interests were treated as rights of separate satisfaction and could be freely exercised. The Rehabilitation Act is more pro-debtor: there is more time to draft a rehabilitation plan, and the court can impose necessary restrictions on collateral rights.

business skills of younger generations and thus increases potential successor shortage. Our first hypothesis is that succession likelihoods decrease with population aging.

The market entry is triggered by advanced technology and competent management, whereas the companies with low productivity due to technology obsolescence exit the market. Active entry strengthens competition and subsequent performance of firms in obsolescence fall sharply. Active entry is followed by M&A wave and bankruptcy wave. In a static environment of low entry, poor performance may decline little and little and thus underperforming firms survive longer. In other words, both inactive entry and inactive exit could be twin outcomes of hindered metabolism due to population aging. Our second hypothesis is that population aging impedes exit—bankruptcy, suspension/closure, acquisition. Tsuruta (2021) find aged CEOs without a successor tend to exit or go bankrupt subsequently. We know little about the linkage of exit and population aging, however.

Strategies for passing the firm on to younger someone of the family differs greatly from exit strategies by closing business at the time of future retirement. To be ready for smooth business closures, risk-taking and investment are more likely to be refrained, and cash holding increases its importance to avoid insolvency. Combining impeded successions and impeded closures due to lack of a successor or no succession intentions, closures by aged owners delay in an aging society. Consequentially, population aging adversely affects small business performance, as the share of underperforming small businesses operated by aging CEOs with intentions of closure. After acquisitions, underperforming small businesses are acquired by talented managers. If population aging blocks acquisitions, more underperforming small firms due to incompetent management would stay behind. Bankruptcy eliminates insolvent small firms and impeded bankruptcy results in more firms in distress.

Like entry, exit significantly contributes to aggregate productivity. As consequence of low entry and low entry attributed to aging, small business performance declines. In the U.S., aging of state population has an adverse effect on labor productivity of workers across the age distribution and this effect is twice of the effect arises from slower labor force growth (Maestas,

Mullen and Powell, 2016). Our third hypothesis is that population aging impedes small business metabolism, and this consequently adversely affect firm performance.

### 3. Data

In this study we utilize TSR financial firm data to link population aging to entrepreneurial exit routes. The TSR financial data includes balance sheet and income statement, location of firm, firm age, industry as well as information on CEO age during 2008-2019. We identify successions using information on CEOs. Also, the TSR also provides detailed information on insolvency. Insolvency includes bankruptcies supervised by the court such as a petition filed under the Bankruptcy Act, or the Civil Rehabilitation Act, or, the Corporate Reorganization Act, or the Special Liquidation of the Company Act<sup>2</sup>. Additionally, suspensions of transactions with banks are also viewed as insolvency<sup>3</sup>. Receiving the dispositions of suspension of transactions with banks means the death of a firm.

The TSR data consists of information on voluntary exit such as business suspension, business closure and dissolution for firms disappeared from TSR database as well as information on acquisitions for firms dropped from the database. In Japan, a construction company must submit business closure notification to the local government or the Ministry of Land, Infrastructure, Transport and Tourism in cases of the death of permitted entrepreneur, acquisition, dissolution and bankrupt<sup>4</sup>. A limited company is viewed as de facto dissolution by the Ministry of Justice if the registration has not been renewed for 12 year or longer. Possibly, additional closures are identified

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<sup>2</sup> Civil Rehabilitation proceedings, Corporate Reorganization proceedings, and the Special Liquidation proceedings are court-driven debtor-in-possession procedures and in the proceedings under the Bankruptcy Act the court appoints a trustee to sell corporate assets and distribute the proceeds to creditors.

<sup>3</sup> In Japan, the member banks of the clearing house will impose the disposition of suspension of transactions with a firm that has dishonored bills two times in last six months. All banks can withdraw loans for the forfeiture of benefit of time by offsetting loans with deposits or by seizing collaterals.

<sup>4</sup> In Japan, a construction work with contract amount value per project of 5 million yen or more (15 million yen or more in the case of complete construction work) needs a permit for construction business within a prefecture from the governor for or the Minister of Land, Infrastructure, Transport and Tourism for construction business across prefectures.

based on TSR's original information.

Our population aging data is the share of population aged 65 or older from the statistics on population by age based on the Basic Resident Register System of the Ministry of Internal Affairs and Communications. Regional economic growth is the growth of prefecture GDP from Cabinet Office. The ease of short term borrowing is the diffusion index statistics by industry from SME Support Japan.

Summary statistics are in Table 1. Succeeded firms are larger, low leveraged. On average, the incumbent CEO is about 65 year old and the successor is about 51 year old. In comparison with CEOs staying with the firm, CEO aging triggers successions. Voluntarily closed firms are smallest and cash rich. Both voluntary exit and bankruptcy are triggered by poor profitability. Less profitable, larger firms are acquired.

#### **4. Empirical Results**

We examine the effects of population aging, population aging\*ln (number of employees), GDP growth, change in long-term interest rate, change in real exchange rate, financial ratios, firm age, and CEO age on survival according to exit route. Our financial ratios include leverage, EBITDA/Assets, Sales/Assets, current ratio, and Fixed assets/Assets ratio. Firm size is measured as the logarithm of assets. We include the logarithm of firm age and the logarithm of CEO age. Industry dummy and year dummy are controlled.

##### **Population aging and entrepreneurial exit**

Table 2 reports our multinomial logit regression results. We classify exit routes to five categories: CEO staying with the firm, bankruptcy, voluntary exit, acquisition, and successions. The category of voluntary exit includes business suspension, business closure and dissolution which are reasons of firms disappeared from TSR database. The category of bankruptcy includes firms filed for liquidation, firms received disposition of suspension of bank transactions, out-court

liquidation of insolvent companies.

### **Insolvencies**

Small firms that are not able to meet its debt obligations and such firms are forced into reorganization or bankruptcy. Exiting significantly contribute to aggregate productivity (Melitz and Polanec, 2015; Hogen et al., 2017; Nakamura et al. 2018). Going bankrupt decreases with population aging, however. Insolvent firms tend to be larger. Both bankruptcy and reorganization are costly. This suggests that larger insolvent firms have more resources that help them to restructure debts. Different from acquired firms, insolvent firms have poor performance as well as sluggish sales. Both CEO age and firm age have a U-shaped effect on insolvency.

### **Closures**

Conventionally, acquisition or takeover has a negative meaning, and the M&A market has been developing. Recently, M&A has been increasing its importance as a growth strategy for outperforming firms, as reported in the 2021 White Paper. But very small firms cannot afford expensive M&A expenses such as due diligence costs and commissions. If seeking acquisition is not the best choice, an aging owner CEO without a qualified successor may extend retirement age temporarily if the current income is higher than the reservation wage. Sooner or later, the aging CEO need to close the businesses upon retirement.

Business closures decrease with population aging, however. The U-shaped effect of CEO age implies that young CEOs are prone to close their firms. Firm age has an inverted U-shaped effect on closure likelihood. Closed firms are much smaller than survivals. Such firms cannot afford expensive M&A expenses. Moreover, the closed firms are prone to be underperforming in terms of both profitability and sales. Small firms with sluggish sales are not suitable for acquisition, as shown above. Closed firms are high leveraged but hold more cash. To close a firm, the CEO needs cash to repay debt that the company owes. In Tsuruta (2021), small firms without

a successor hold more cash. In Xu (2019), voluntarily exiting firms have more cash than firms that are forced to exit through bankruptcies. This suggests an aging small business CEO without a successor might hold more cash to repay its debts in tension toward closure. Business closures increase with the ease of short-term borrowing but decrease with economic growth.

### **Acquisitions**

As more and more small and medium sized firms facing difficulty to seek a qualified business successor, other exit routes are M&A, closure, or bankruptcy. An aging CEO without a potential qualified successor may sell a firm. Population aging lowers acquisition likelihood at the ten percent level. Acquired firms have poor profitability, high leverage, few tangible assets, but satisfactory sales. CEO age has inverted U-shaped effect on acquisition likelihood and the effect of firm age is U-shaped. Regional economic growth is insignificant but the ease of short-term borrowing lowers acquisition likelihoods.

More importantly, acquired firms are larger. Larger firms have more resources that help them to survive when they are facing economic difficulties such as underperformance and distresses (Cefis et al., 2021). More financial resources are particularly necessary to afford expensive legal fees and financial service fees of M&A or reorganization. Larger firms have high notability and have more potential acquirers (Diamond and Verrecchia 1991). Moreover, large firms are more transparent for higher quality of financial statements and many sources of information (Bharath et al. 2007; Zeghal 1984) and thereby due diligence of M&A costs are relatively lower. Recently, investment in new capital formation declines and M&A increases its importance as a growth strategy for outperforming firms. In Nakamura et al. (2018), listed firms in Japan exit the stock market via acquisitions before sales and profits deteriorating. Our results suggest that underperforming small and medium sized firms seek acquisitions as a strategy of flight from losses. Of course, acquisitions are not limited to firms without a qualified successor.

## **Successions**

Population aging lowers the succession likelihoods of small companies. Business successions are transfers of businesses to younger generation with required business skills. Aging blocks younger employees from acquiring business skills and this in turn lowers succession likelihoods. Also, the size difference of succession likelihood increases with population aging. The effect of CEO age on succession is U-shaped. Young firms are more likely to be succeeded. The probability around is lower but sales are better in comparison with survivals. Succeeded firms have lower leverage, more cash but few tangible assets. Moreover, succeeded firms tend to be larger. Regional economic growth is not relevant but the ease of short-term borrowing lowers succession likelihoods.

## **Results by industry**

Splitting sample firms by industry, we find differences among industries. The effects of population aging on succession, voluntary exit and bankruptcy are mainly driven by the choices of exit route of construction companies. The sample size of construction companies is more than 50%. As for wholesale industry, successions, acquisitions, business closures and bankruptcies decrease with population aging. Population aging only hinders the bankruptcies of small retail companies. Regarding to service industry, population aging lowers the bankruptcy likelihood and acquisition likelihood. Exceptionally, population aging neither lowers succession nor lower bankrupt likelihood in small manufacturing industrial firms. Rather, business closures of small manufacturing companies increase with population aging significantly at the five percent level.

For all industries, disparities of succession in firm size are observed in all industries. Likewise, bankrupt firms have poor profitability, high leverage, and low cash holdings in any industries. Moreover, closed firms are the smallest and large firms are more likely to be succeed or be acquired. Unperforming firms, firms with satisfactory sales tend to seek acquisitions. In sum, bankrupt eliminates insolvent inefficient firms, closure eliminates smaller solvent undeforming



firms. Acquisition eliminates incompetent CEOs exit business and the acquired firms remain the market.

### **Succession as natural selection**

Business successions in an aging society are also the resource allocation of scarcer younger people with business skills. A question arises: Are the successions natural selection? Table 2 reports multinomial logit regressions that base outcome is voluntary exit. The result indicates succeeded firms are profitable firms, with decent sales, low leveraged and larger. In other words, underperforming firms, smaller firms, firms with sluggish sales, high leveraged firms are less likely to be succeed but are more likely to exit voluntarily. This strongly suggests that scarcer younger people with business skills are allocated to more profitable, low leveraged, larger firms in comparison with closed firms.

Conventionally, studies focus on bankruptcy as failure. By filing for bankruptcy, failed insolvent firms are eliminated. As shown above, business owners tend to close unsuccessful but solvent businesses and less successful business owners seek acquisition for rescue. Our new evidence suggests successful business are more likely to be succeeded. Children cannot choose their parents, but they can choose not to succeed their parents' unsuccessful businesses. In this sense, business succession is an early stage of natural selection.

### **Population aging and small firm performance**

Our results suggest that metabolism declines with population aging. Underperforming small firms are eliminated via closures and bankruptcy. Underperforming small and medium-sized enterprises are acquired. Population aging, however, hinders such metabolism. The likelihood of no succession increases with population aging and more and more small firms scale back and their performance remains sluggish. In Psychology, positive risk-taking varies with age in the form of an inverted-U shape and peaked in middle adulthood. Also, energy and creativity decline

with age. Accordingly, a young successor is more likely to bring changes to the firm. As soon as it becomes clear that there is no succession, the aging CEO will continue to run the business in a manner with the aim of going out of business. TSR business overviews mention that an aging CEO of a small firm without a successor often scales back to run a small operation and the business remains sluggish toward future closure of business. In sum, the share of firms in distress and firms with poor performance increases in a society with more elderly population.

To investigate the effect of population on performance of small and medium sized enterprises, we regress firm performance on population aging. In Table 3 -Table 9, population aging is a driver of poor profitability, high leverage, low investment, and low growth of small firms as well as size disparity of performance. Cash holding of small firms increases with population aging. The results suggests that not only small business metabolism but also small business performance decline, as the population ages.

In above logit estimates and performance regressions, prefecture economic growth, the diffusion index of short term borrowing, and industry dummy are controlled, to capture the effects of prefecture economic growth that can affect its age structure by influencing migration and mortality and uniform monetary policy responses. Also, time dummy is included to assess the effect of delayed retirement for pension reforms. All results remain unchanged after including prefecture dummy. The omitted results with prefecture dummy are available upon request.

## **Discussions**

In this study, we utilize actual entrepreneurial exit data. Population aging hindering acquisition of business skills of younger generation and this in turn lowers potential younger successors with require business acumen. Similarly, population aging lowers entrepreneurship and entry rate is lower in a aging society. We supplement evidence on entry and population aging. Also, we other issues such as entrepreneurial intentions for exit and strategies for exit.

### **Population aging and new firms**

In Liang et al. (2019), entrepreneurships decrease with population aging. We link the existence of young firms on population aging, the ease of short term borrowing and regional economic growth. A young firm is defined as a firm with firm age of 5 year or younger. If population aging decreases entrepreneurships, population aging has a negative effect on the likelihood being young. As Table 10 indicates, the likelihood being new firm (firm age of 5 year or younger) robustly decreases with population aging. The supplement suggests that both entrepreneurships and business successions decrease with population aging. In other words, population aging hinders metabolism at firm level as well as at individual level.

### **Population aging and CEO aging**

Our study sheds new light on business successions in aging Japan. Successions contribute to rejuvenation of CEO but population aging hinder successions. However, this not necessarily increases CEO ages if an elderly CEO without a successor retires as do CEOs with a successor. Another channel is lower entry rate in the aging society. New firms are established by younger generation entrepreneurs. Now, we regress CEO age on firm age and financial ratios. In Table 11, population aging increase CEO age of small construction companies. Also, the size difference of CEO age increases with population aging. In short, CEO aging driven by population aging is a phenomenon in small firms.

### **Entrepreneurial intentions of succession**

We utilize data on actual entrepreneurial exit. Our study is the first to provide evidence that actual business successions decrease with population aging. A small firm is eventually closed simply because the owner has no intentions to pass on it to someone of the family. The 2019 White Paper on Small and Medium Enterprises documents a survey on reasons of voluntary exits. 58% of the business owners who closed their businesses answered they had no intention of passing

their businesses over to the next generation. An entrepreneur (necessity entrepreneur) may run a small company simply for a living but has no intentions to pass the business on to someone of the family. In other words, it is more likely to simply close the firm upon retirement. We need survey data to figure out how population aging is related to intentions not to pass the business over to someone of the family.

The next most common responses were "The future of the business was not foreseeable" (41.6%). For other economic reasons, 19.6% answered "The business was not worth taking over" and 19.4% answered "The underlying profitability of the business was low". In Harada, 2007, the most important reason for voluntary exit was "despairing perception of further business". Tsuruta (2021) shows that smaller, younger, highly leveraged, and low growing firms are less likely to have a successor. Consistently, our result on actual successions suggests that unsuccessful firms are less likely to be succeeded.

As for lack of a qualified successor, 19.8% said "There was no qualified successor candidates". The key point is seeking "qualified" successor candidates to successfully succeed companies. An unqualified successor would easily destroy a small firm. However, population aging hinders acquisition of business skills of younger generation in Liang et al. (2018) and this also decreases potential qualified successor candidates. Consequentially, more small firms are facing difficulty to seek a qualified business successor. Partially, our result on actual successions are in support of hypothesis that the difficulty in seeking a qualified successor increases as the population ages.

### **Closures of profitable small firms**

Recently, it is argued that quite a few profitable small firms closed their businesses for no successors. In this paper, we distinguish business closures with actual successions. Consistent with previous studies, not only profitability but also firm size is a key of successions. In the 2021 White Paper on Small and Medium Enterprises, about 80% of voluntary exits in 2020 have 0-5 employees. The following example illustrates that a profitable smaller firm may be closed but a

less profitable larger firm may be succeeded. Suppose one firm A with one employee, assets of ¥1 million and profits of ¥0.2 million<sup>5</sup> and another firm B with 10 employees, assets of ¥10 million and profits of ¥1.5 million. A is more profitable but smaller than B. We cannot say that it is not efficient that the only one qualified potential successor succeeds B, but A is closed. A larger firm is more capable to organizationally train younger relatively for succession to acquire firm specific knowledge. Firm size might be a good proxy for organizational capability.

One may argue why A's owner does not sell the firm. Our results suggests that smaller firms are less likely to be acquired. This is because small firms cannot afford expensive M&A expenses such as due diligence costs and commissions. Also, smaller firms are less notable and less transparent. Moreover, closing a smaller firm does not necessarily mean no redeployment of its resources. The 2019 White Paper on Small and Medium Enterprises shows that the employees of closed firms were mainly re-employed by the suppliers, the customers, or the close industrial peers. 65.6% of customer-supplier relationships of closed firms were succeeded by the suppliers or the customers, or the close industrial peers. About 60% of the closed companies owned business facilities, and 53.6% of owned facilities have been redeployed by close industrial peers or former executives or former employees to start business. Such business closures are virtual business successions by suppliers, customers, or industrial peers. Due to low notability of small firms, acquirers are limited to suppliers, customers, executives, employees, or close industrial peers. Though such takeovers do not take the form of acquisition, closed profitable small businesses might quite remain in the market. We need more tracking down investigations of profitable small firms when the entrepreneurs have gone out of business.

### **Pre-closure performance for lack of succession**

In this study, the effect of population aging might be interpreted partially as the effect of

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<sup>5</sup> In 2015, on average a closed small firm earned ¥0.2 million and the survivals earned ¥1.4 million, as the 2019 White Paper reports.

lack of succession. A middle aged CEO without a successor executes exit strategies quite differently in comparison with a middle aged CEO with a successor. Particularly, an aging CEO facing declining physical strength without succession conducts business appropriately to be ready for future business closure. Such a firm is more likely to scale back and to refrain from investing. As a result, both performance and growth of firms without a successor or without intentions of succession decline.

In comparison, a succession replaces the elderly CEO with a younger CEO. Management requires energy and creativity. Energy and creativity decrease with age, however. Thus, successions might have a significant impact on firm growth and firm performance. Previous studies focused on family businesses and investigated the performance of firms after the succession or CEO turnover (Smith and Amoako-Adu, 1999; Huson et al., 2004; Pérez-González, 2006; Bennedsen et al., 2007; Chung and Luo, 2013; Diwisch et al., 2009; Uesugi and Saito, 2009; Tsuruta, 2021) at firm level. Differently, our estimates incorporate all adverse effects of population aging that vary across prefectures, such as aging-induced reductions in the business startup rate, aging-induced impeded exit and acquisition, and aging-induced decline in successions.

## **5. Conclusions**

In this study, we investigate the effect of population aging on successions, exits and mergers of small businesses. Population aging lowers the succession likelihoods of small construction companies. Also, the size difference of succession likelihood increases with population aging. CEO aging and CEO age difference in firm size is driven by population aging. By contrast, economically inefficient, high leveraged, small firms are less likely to be succeeded but are more likely to exit via bankruptcy or voluntary exits. Population aging impedes small business metabolism and consequentially population aging is a driver of poor profitability, low investment, and low growth of small firms as well as performance disparity. Cash holding of small firms

increases with population aging, probably because more small firms without succession need to be ready for smooth business closures.

Expensive gift tax and inheritance tax might hinder successions. Measures that that defers the payment of gift tax and inheritance tax on certain assets acquired by successors are launched to enhance business succession. M&A costs are the key to enhance efficient redeployment of resources of small firms when the owners have gone out of businesses. It remains an important topic to examine the effects of measures subsidizing M&A commissions and due diligence fees and measures to enhance redeployment of resources of closed firms on exit routes. Also, we need data for research into redeployment of resources of closed firms such as employees, long-term relationships, and facilities.

Our results have important policy implications—increases in youngers with business skills are the key to economic vitality. To recruit foreigners with business skills, Japan has revised the previous Investment Management visa policy to issue the Business Manager visa. It enables young foreigners to establish a company, succeed a company or work for a company as manager in Japan. More recently, the Kishida administration unveiled unprecedented countermeasures for the declining birthrate.

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Figure 1 Population aging

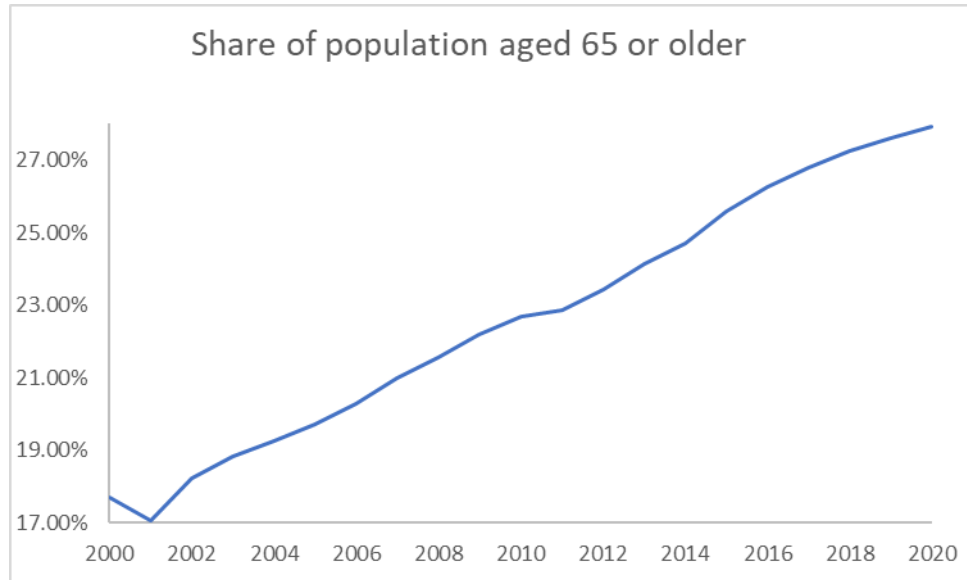


Table 1 Summary statistics

Variable	Stay with the firm				Succession			
	p50	Mean	SD	N	p50	Mean	SD	N
rage65older	0.250038	0.25031	0.031093	3005455	0.242042	0.243615	0.030888	98510
rage65oldsize	0.502514	0.548561	0.280499	3005455	0.629739	0.672609	0.303161	98510
ceoage	58.75	57.7275	11.06271	3005455	65.25	64.69951	10.50217	98510
fceoage	59.83333	58.82328	10.93719	2736109	50.91667	51.3851	11.10726	98487
firmage	26.91667	29.03938	16.40848	3005455	31.91667	32.72855	16.76037	98510
lceoage	4.073291	4.036149	0.201949	3005455	4.178226	4.154846	0.179236	98510
lceoagesqrd	16.5917	16.33128	1.606775	3005455	17.45757	17.29487	1.447993	98510
lfirmage	27.91667	30.03938	16.40848	3005455	32.91666	33.72855	16.76037	98510
lfirmagesqrd	779.3403	1171.602	1190.122	3005455	1083.507	1418.522	1294.737	98510
ebitdaA_win	0.04164	0.064746	0.210774	3005455	0.039493	0.044404	0.151138	98510
cash_win	0.215309	0.269106	0.218233	3005455	0.203362	0.252699	0.203508	98510
leverage_win	0.739763	0.87118	0.861931	3005455	0.683565	0.749858	0.641732	98510
slsassets_~n	1.619018	2.065182	1.672524	3005455	1.517115	1.88729	1.494728	98510
rtassets_win	0.201955	0.266488	0.238337	3005455	0.193377	0.253068	0.231592	98510
lassets	11.40882	11.50192	1.864994	3005455	12.42987	12.47291	1.898158	98510
DI_SF	-7.9	-10.4911	22.87093	3005455	-14.3	-15.166	21.74435	98510
grngdp	0.8	0.564751	2.71842	3005455	0.6	0.361689	2.810154	98510

Table 1 Summary statistics cont'd

Variable	Go bankrupt				Gone with the firm				Leave the firm to an acquirer			
	p50	Mean	SD	N	p50	Mean	SD	N	p50	Mean	SD	N
rage65older	0.232543	0.23522	0.028407	15214	0.241705	0.244028	0.029597	39422	0.235513	0.240008	0.030849	6481
rage65oldsize	0.47519	0.501791	0.213585	15214	0.328328	0.358751	0.182161	39422	0.653401	0.675836	0.325102	6481
ceoage	57.83333	57.0025	11.50252	15214	64.41666	63.44367	10.717	39422	58.66667	57.5228	10.3546	6481
fceoage	.	.	.	0	.	.	.	0	.	.	.	0
firmage	23	25.56356	16.13152	15214	25.91667	27.74544	15.14707	39422	23.08333	25.50968	17.21545	6481
lceoage	4.057565	4.021327	0.213048	15214	4.165372	4.134098	0.185621	39422	4.071872	4.034717	0.19134	6481
lceoagesqrd	16.46383	16.21646	1.688375	15214	17.35033	17.12522	1.494698	39422	16.58014	16.31555	1.517453	6481
lfirmage	24	26.56356	16.13152	15214	26.91667	28.74544	15.14707	39422	24.08333	26.50968	17.21545	6481
lfirmagesqrd	576	965.8315	1065.979	15214	724.5069	1055.728	1056.722	39422	580.007	999.0893	1179.228	6481
ebitdaA_win	0.019759	-0.02897	0.226455	15214	0.015324	0.005919	0.325699	39422	0.035354	0.026961	0.188581	6481
cash_win	0.074479	0.12974	0.152462	15214	0.234907	0.310823	0.2695	39422	0.155485	0.227984	0.223515	6481
leverage_win	1.004494	1.446398	1.154964	15214	0.825824	1.331623	1.565534	39422	0.726393	0.814289	0.753393	6481
slsassets_~n	1.458089	1.984378	1.754119	15214	1.615998	2.300139	2.221995	39422	1.662517	2.077419	1.805083	6481
rtassets_win	0.161339	0.23991	0.237891	15214	0.161273	0.265865	0.275113	39422	0.091797	0.212301	0.258418	6481
lassets	11.62994	11.6298	1.527945	15214	9.871481	9.973578	1.643771	39422	12.74394	12.79825	1.803914	6481
DI_SF	-23.7	-21.5486	22.69743	15214	-14.3	-16.7358	23.40353	39422	-13.3	-15.8094	21.24308	6481
grngdp	0.5	0.048948	2.920573	15214	0.6	0.293433	2.896411	39422	0.7	0.422682	2.726379	6481

Table 2a Bankruptcy, Voluntary exit, Acquisition and Succession (All)

	All industries			
VARIABLES	Bankruptcy	Closure	Acquisition	Succession
age65older	-4.025***	-2.666***	-1.110*	-2.135***
	[0.373]	[0.234]	[0.568]	[0.158]
age65oldersize	-0.804***	-1.360***	-0.0352	0.512***
	[0.0415]	[0.0380]	[0.0614]	[0.0193]
iceoage	-9.443***	-15.86***	5.968***	-25.88***
	[0.991]	[0.826]	[2.167]	[1.460]
iceoagesqrd	1.175***	2.278***	-0.697**	3.661***
	[0.126]	[0.102]	[0.271]	[0.179]
lfirmage	-0.0259***	0.0114***	-0.0352***	-0.00305***
	[0.00155]	[0.00119]	[0.00269]	[0.000817]
lfirmagesqrd	0.000214***	0.000124**	0.000167***	-8.05E-06
	[2.04e-05]	[1.66e-05]	[3.73e-05]	[1.05e-05]
ebitdaA_win	-0.837***	-0.572***	-1.170***	-0.415***
	[0.0413]	[0.0199]	[0.103]	[0.0217]
cash_win	-4.486***	0.242***	-0.170**	0.0744***
	[0.0801]	[0.0264]	[0.0805]	[0.0199]
leverage_win	0.442***	0.0538***	0.0650***	-0.106***
	[0.00677]	[0.00462]	[0.0252]	[0.00604]
slsassets_win	-0.0849***	-0.123***	0.107***	0.109***
	[0.00641]	[0.00374]	[0.00884]	[0.00263]
rtassets_win	-1.443***	-0.0279	-0.950***	-0.455***
	[0.0377]	[0.0255]	[0.0752]	[0.0184]
lassets	0.188***	-0.477***	0.326***	0.217***
	[0.00687]	[0.00560]	[0.0107]	[0.00364]
DI_SF	-0.00158	0.00239***	-0.00358*	-0.00601***
	[0.00116]	[0.000763]	[0.00197]	[0.000444]
grngdp	-0.00954**	-0.00656**	0.00841	-0.00116
	[0.00400]	[0.00258]	[0.00680]	[0.00173]
Constant	15.20***	29.70***	-20.88***	39.19***
	[1.950]	[1.675]	[4.310]	[2.970]
Observations	3,165,082	3,165,082	3,165,082	3,165,082
Pseudo R2	0.101	0.101	0.101	0.101
Log pLik	-711583	-711583	-711583	-711583

Table 2b Bankruptcy, Voluntary exit, Acquisition and Succession (Construction)

Construction				
VARIABLES	Bnakruptcy	Closure	Acquisition	Succession
rage65older	-1.889***	-3.392***	2.096	-3.182***
	[0.511]	[0.295]	[1.374]	[0.236]
rage65oldersize	-1.428***	-1.403***	0.236	1.177***
	[0.0678]	[0.0539]	[0.227]	[0.0381]
lceoage	-7.354***	-12.38***	-5.181	-42.73***
	[1.447]	[1.189]	[4.495]	[1.527]
lceoagesqrd	0.939***	1.879***	0.738	5.815***
	[0.183]	[0.146]	[0.564]	[0.187]
lfirimage	-0.0346***	0.0172***	-0.0258***	-0.00295**
	[0.00205]	[0.00162]	[0.00730]	[0.00140]
lfirimagesqrd	0.000327***	0.000219**	-2.41E-05	-8.61e-05***
	[2.68e-05]	[2.32e-05]	[0.000108]	[1.96e-05]
ebitdaA_win	-0.764***	-0.576***	-1.987***	-0.453***
	[0.0540]	[0.0220]	[0.230]	[0.0265]
cash_win	-4.679***	0.249***	-0.516***	-0.0523*
	[0.103]	[0.0319]	[0.181]	[0.0271]
leverage_win	0.498***	0.0517***	-0.0637	-0.111***
	[0.00914]	[0.00526]	[0.0620]	[0.00757]
slsassets_win	-0.0783***	-0.151***	0.185***	0.114***
	[0.00899]	[0.00453]	[0.0235]	[0.00384]
rtassets_win	-1.594***	0.0276	-2.292***	-0.317***
	[0.0503]	[0.0307]	[0.238]	[0.0263]
lassets	0.397***	-0.528***	0.588***	0.221***
	[0.0111]	[0.00743]	[0.0382]	[0.00618]
DI_SF	-0.0286***	-0.0263***	-0.0152***	-0.0260***
	[0.00142]	[0.000824]	[0.00331]	[0.000616]
grgngdp	-0.0115**	0.00862**	0.00409	-0.000607
	[0.00509]	[0.00305]	[0.0142]	[0.00241]
Constant	7.254**	21.63***	-4.868	71.07***
	[2.852]	[2.417]	[8.900]	[3.093]
Observations	1,983,599	1,983,599	1,983,599	1,983,599
Pseudo R2	0.111	0.111	0.111	0.111
Log pLik	-385588	-385588	-385588	-385588



Table 2c Bankruptcy, Voluntary exit, Acquisition and Succession (Wholesale)

Wholesale				
VARIABLES	Bnakruptcy	Closure	Acquisition	Succession
rage65older	-6.006***	-2.342***	-1.687*	-2.966***
	[0.841]	[0.537]	[0.901]	[0.302]
rage65oldersize	-0.347***	-1.254***	-0.298***	0.221***
	[0.0731]	[0.0653]	[0.0827]	[0.0279]
lceoage	-7.314***	-12.75***	11.89***	-11.90***
	[2.267]	[2.967]	[3.478]	[2.208]
lceoagesqrd	0.858***	1.841***	-1.458***	1.834***
	[0.287]	[0.366]	[0.434]	[0.270]
lfirmage	-0.0143***	0.00148	-0.0373***	0.00278*
	[0.00372]	[0.00264]	[0.00405]	[0.00150]
lfirmagesqrd	0.000106**	2.19E-05	0.000265***	-1.02E-05
	[5.06e-05]	[3.53e-05]	[5.38e-05]	[1.84e-05]
ebitdaA_win	-1.006***	-0.416***	-1.067***	0.152**
	[0.114]	[0.0640]	[0.187]	[0.0632]
cash_win	-3.476***	0.269***	0.336***	0.797***
	[0.171]	[0.0632]	[0.121]	[0.0387]
leverage_win	0.389***	0.0993***	0.0914**	-0.0168
	[0.0161]	[0.0123]	[0.0403]	[0.0126]
slsassets_win	-0.0297**	-0.0946***	0.0940***	0.109***
	[0.0129]	[0.00991]	[0.0136]	[0.00467]
rtassets_win	-1.510***	-0.501***	-0.684***	-0.353***
	[0.0899]	[0.0663]	[0.110]	[0.0362]
lassets	0.0447***	-0.401***	0.287***	0.189***
	[0.0137]	[0.0121]	[0.0160]	[0.00611]
DI_SF	-0.115***	-0.101***	-0.0457***	-0.0619***
	[0.00862]	[0.00560]	[0.00790]	[0.00266]
grgngdp	-0.00646	-0.00776	-0.00306	0.000599
	[0.00963]	[0.00671]	[0.0110]	[0.00355]
Constant	13.55***	23.89***	-31.43***	13.25***
	[4.469]	[5.998]	[6.946]	[4.504]
Observations	610,186	610,186	610,186	610,186
Pseudo R2	0.0752	0.0752	0.0752	0.0752
Log pLik	-161767	-161767	-161767	-161767

Table 2d Bankruptcy, Voluntary exit, Acquisition and Succession (Retail)

Retail				
VARIABLES	Bnruptcy	Closure	Acquisition	Succession
rage65older	-4.551***	-0.0627	-1.051	0.195
	[1.497]	[1.214]	[1.814]	[0.719]
rage65oldersize	-0.384**	-1.480***	-0.0454	0.609***
	[0.181]	[0.218]	[0.219]	[0.102]
lceoage	-9.551**	-20.19***	-1.194	-28.62***
	[4.074]	[3.064]	[5.806]	[3.702]
lceoagesqrd	1.180**	2.788***	0.196	4.003***
	[0.521]	[0.383]	[0.736]	[0.456]
lfirmage	-0.0405***	-0.0127***	-0.0510***	-0.00509
	[0.00542]	[0.00460]	[0.00792]	[0.00346]
lfirmagesqrd	0.000306***	0.000119**	0.000302***	-2.84E-05
	[6.95e-05]	[5.72e-05]	[0.000109]	[4.46e-05]
ebitdaA_win	-1.109***	-0.758***	-0.671**	-0.275*
	[0.193]	[0.147]	[0.326]	[0.150]
cash_win	-5.343***	0.0535	-0.2	0.0923
	[0.424]	[0.158]	[0.283]	[0.112]
leverage_win	0.436***	0.0776**	0.383***	-0.164***
	[0.0334]	[0.0309]	[0.0658]	[0.0416]
slsassets_win	-0.0244	-0.0215	0.0580**	0.0826***
	[0.0220]	[0.0171]	[0.0246]	[0.0110]
rtassets_win	-0.854***	-0.288*	-0.337	-0.256***
	[0.164]	[0.148]	[0.216]	[0.0892]
lassets	0.151***	-0.373***	0.370***	0.160***
	[0.0302]	[0.0326]	[0.0398]	[0.0205]
DI_SF	-0.0466***	-0.0595***	-0.0135	-0.0279***
	[0.00880]	[0.00659]	[0.00937]	[0.00386]
grgngdp	0.00292	0.0162	0.0366*	-0.00211
	[0.0185]	[0.0132]	[0.0214]	[0.00823]
Constant	13.77*	34.61***	-7.584	43.44***
	[7.933]	[6.120]	[11.37]	[7.479]
Observations	117,021	117,021	117,021	117,021
Pseudo R2	0.0852	0.0852	0.0852	0.0852
Log pLik	-31543	-31543	-31543	-31543

Table 2e Bankruptcy, Voluntary exit, Acquisition and Succession (Service)

Service				
VARIABLES	Bnakruptcy	Closure	Acquisition	Succession
rage65older	-5.459***	0.477	-4.295***	-0.558
	[1.400]	[0.963]	[1.458]	[0.536]
rage65oldersize	-0.327**	-1.825***	0.0059	0.315***
	[0.136]	[0.140]	[0.150]	[0.0533]
lceoage	-9.297***	-17.46***	2.069	-17.56***
	[3.119]	[3.898]	[5.531]	[3.638]
lceoagesqrd	1.117***	2.434***	-0.201	2.544***
	[0.402]	[0.490]	[0.698]	[0.450]
lfirmage	-0.0133**	-0.00925*	-0.0301***	-0.00235
	[0.00617]	[0.00502]	[0.00685]	[0.00253]
lfirmagesqrd	8.94E-05	0.000154*	8.83E-05	3.67E-05
	[9.12e-05]	[8.06e-05]	[0.000107]	[3.41e-05]
ebitdaA_win	-0.626***	-0.682***	-0.516**	-0.538***
	[0.130]	[0.101]	[0.239]	[0.0944]
cash_win	-3.824***	0.055	-0.206	-0.0359
	[0.256]	[0.112]	[0.183]	[0.0704]
leverage_win	0.374***	0.0212	0.0506	-0.217***
	[0.0258]	[0.0240]	[0.0686]	[0.0330]
slsassets_win	-0.0141	-0.0842***	0.0879***	0.0944***
	[0.0207]	[0.0159]	[0.0232]	[0.00970]
rtassets_win	-0.648***	-0.0198	-0.605***	-0.711***
	[0.133]	[0.119]	[0.172]	[0.0611]
lassets	-0.0138	-0.312***	0.260***	0.212***
	[0.0206]	[0.0216]	[0.0221]	[0.00933]
DI_SF	-0.0666***	-0.0581***	-0.0121*	-0.0299***
	[0.00766]	[0.00501]	[0.00702]	[0.00257]
grgngdp	-0.0355**	-0.00847	-0.00699	0.00486
	[0.0164]	[0.0126]	[0.0194]	[0.00693]
Constant	15.22**	29.57***	-11.98	22.94***
	[6.077]	[7.709]	[10.96]	[7.322]
Observations	167,303	167,303	167,303	167,303
Pseudo R2	0.0801	0.0801	0.0801	0.0801
Log pLik	-49799	-49799	-49799	-49799

Table 2f Bankruptcy, Voluntary exit, Acquisition and Succession (Manufacturing)

Manufacturing				
VARIABLES	Bnakruptcy	Closure	Acquisition	Succession
rage65older	1.001	2.048**	1.089	-0.527
	[1.197]	[1.041]	[1.696]	[0.484]
rage65oldersize	-1.715***	-1.351***	-0.0711	0.541***
	[0.161]	[0.181]	[0.246]	[0.0675]
lceoage	-11.20***	-11.12***	19.95***	-12.79***
	[2.761]	[2.703]	[7.258]	[1.958]
lceoagesqrd	1.433***	1.648***	-2.407***	2.096***
	[0.348]	[0.335]	[0.904]	[0.238]
lfirmage	-0.0296***	0.00503	-0.0330***	-0.0110***
	[0.00440]	[0.00422]	[0.00711]	[0.00201]
lfirmagesqrd	0.000264***	-2.34E-05	7.63E-05	7.14e-05***
	[5.17e-05]	[4.92e-05]	[9.58e-05]	[2.28e-05]
ebitdaA_win	-1.255***	-0.933***	-1.472***	-0.149
	[0.178]	[0.131]	[0.308]	[0.0979]
cash_win	-6.235***	-0.0804	-1.213***	-0.571***
	[0.369]	[0.158]	[0.293]	[0.0770]
leverage_win	0.520***	0.0581**	0.000466	-0.375***
	[0.0273]	[0.0285]	[0.0823]	[0.0308]
slsassets_win	-0.131***	-0.0483**	0.240***	0.171***
	[0.0274]	[0.0233]	[0.0249]	[0.0104]
rtassets_win	-0.731***	-0.0368	-0.816***	-0.0679
	[0.125]	[0.128]	[0.208]	[0.0554]
lassets	0.145***	-0.437***	0.286***	0.128***
	[0.0293]	[0.0315]	[0.0453]	[0.0132]
DI_SF	-0.0767***	-0.0806***	-0.0223**	-0.0308***
	[0.00779]	[0.00686]	[0.00876]	[0.00240]
grgngdp	-0.000448	0.0115	0.0318*	-0.00654
	[0.0129]	[0.0118]	[0.0171]	[0.00473]
Constant	17.46***	18.68***	-49.61***	12.65***
	[5.482]	[5.462]	[14.50]	[4.032]
Observations	286,973	286,973	286,973	286,973
Pseudo R2	0.0832	0.0832	0.0832	0.0832
Log pLik	-78564	-78564	-78564	-78564

Table 2g Succession (base outcome=voluntary exit)

VARIABLES	All	Construction	Wholesale	Retail	Service	Manufacturing
rage65older	0.531*	0.209	-0.624	0.257	-1.035	-2.575**
	[0.277]	[0.372]	[0.606]	[1.382]	[1.082]	[1.134]
rage65oldersize	1.873***	2.579***	1.475***	2.089***	2.140***	1.892***
	[0.0420]	[0.0651]	[0.0699]	[0.238]	[0.148]	[0.192]
lceoage	-10.02***	-30.35***	0.845	-8.432*	-0.0969	-1.672
	[1.595]	[1.884]	[1.364]	[4.437]	[0.678]	[2.825]
lceoagesqrd	1.382***	3.936***	-0.00669	1.215**	0.11	0.449
	[0.195]	[0.231]	[0.170]	[0.549]	[0.0942]	[0.348]
lfirmage	-0.0145***	-0.0202***	0.0013	0.00757	0.00689	-0.0160***
	[0.00143]	[0.00212]	[0.00299]	[0.00581]	[0.00553]	[0.00461]
lfirmagesqrd	0.000116***	0.000133***	-3.22E-05	0.000147*	-0.00012	9.48e-05*
	[1.94e-05]	[3.00e-05]	[3.93e-05]	[7.40e-05]	[8.65e-05]	[5.34e-05]
ebitdaA_win	0.157***	0.124***	0.568***	0.483**	0.144	0.784***
	[0.0289]	[0.0338]	[0.0888]	[0.207]	[0.137]	[0.161]
cash_win	-0.168***	-0.301***	0.528***	0.0388	-0.0909	-0.491***
	[0.0324]	[0.0411]	[0.0728]	[0.191]	[0.130]	[0.173]
leverage_win	-0.160***	-0.162***	-0.116***	-0.242***	-0.238***	-0.433***
	[0.00743]	[0.00902]	[0.0172]	[0.0508]	[0.0400]	[0.0405]
slsassets_win	0.232***	0.265***	0.204***	0.104***	0.179***	0.219***
	[0.00450]	[0.00584]	[0.0108]	[0.0199]	[0.0184]	[0.0251]
rtassets_win	-0.427***	-0.345***	0.147**	0.0321	-0.691***	-0.0311
	[0.0309]	[0.0398]	[0.0747]	[0.170]	[0.131]	[0.138]
lassets	0.694***	0.749***	0.590***	0.533***	0.524***	0.565***
	[0.00659]	[0.00951]	[0.0134]	[0.0377]	[0.0232]	[0.0339]
DI_SF	-0.00840***	0.000219	0.0392***	0.0315***	0.0282***	0.0498***
	[0.000873]	[0.00102]	[0.00615]	[0.00754]	[0.00558]	[0.00722]
grgngdp	0.00539*	0.00801**	0.00836	-0.0183	0.0133	-0.0181
	[0.00308]	[0.00385]	[0.00752]	[0.0154]	[0.0143]	[0.0126]
Constant	9.486***	49.44***	-10.64***	8.833	-6.627***	-6.031
	[3.246]	[3.827]	[2.759]	[8.940]	[1.361]	[5.751]
Observations	3,165,082	1,983,599	610,186	117,021	167,303	286,973
Pseudo R2	0.101	0.111	0.0752	0.0852	0.0801	0.0832
Log pLik	-711583	-385588	-161767	-31543	-49799	-78564

Table 3 Profitability (EBITDA/assets)

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	-0.375*** [0.0277]	-0.174*** [0.0583]	-0.466*** [0.0470]	-0.491*** [0.0417]	-0.0109 [0.139]	-0.16 [0.113]
rage65oldersize	0.0259*** [0.00138]	0.0366*** [0.00505]	0.0341*** [0.00226]	0.00952*** [0.00164]	0.0377*** [0.00669]	0.0378*** [0.00646]
L.lceorage	0.223*** [0.0365]	0.108 [0.0665]	0.174*** [0.0487]	0.308*** [0.0630]	0.108 [0.133]	0.553*** [0.170]
L.lceorgesqrd	-0.0306*** [0.00459]	-0.0149* [0.00835]	-0.0248*** [0.00614]	-0.0405*** [0.00787]	-0.0157 [0.0167]	-0.0711*** [0.0214]
lfimage	0.00780*** [0.000191]	0.00183*** [0.000539]	0.00961*** [0.000224]	-0.000137 [0.000347]	0.00121 [0.000920]	0.00383** [0.00181]
lfimagesqrd	-3.78e-05*** [1.35e-06]	-2.10e-05*** [2.62e-06]	-5.94e-05*** [2.06e-06]	6.14e-06*** [2.02e-06]	1.32E-06 [5.39e-06]	-1.46e-05** [6.69e-06]
L.ebitdaA_win	0.0141*** [0.00174]	0.0310*** [0.00677]	0.0116*** [0.00197]	0.0102* [0.00556]	0.00416 [0.0107]	0.0140* [0.00798]
L.cash_win	-0.0138*** [0.00160]	-0.0112** [0.00556]	-0.0163*** [0.00192]	-0.000419 [0.00355]	0.00986 [0.00871]	-0.0212*** [0.00728]
L.leverage_win	0.110*** [0.000964]	0.133*** [0.00502]	0.107*** [0.00106]	0.122*** [0.00359]	0.143*** [0.00688]	0.114*** [0.00550]
L.slsassets_win	-0.00912*** [0.000309]	0.000705 [0.00154]	-0.0113*** [0.000357]	0.00125 [0.000769]	0.000833 [0.00143]	-0.00301* [0.00178]
L.rtassets_win	-0.0407*** [0.00199]	-0.0126** [0.00563]	-0.0537*** [0.00252]	-0.00268 [0.00365]	0.00281 [0.00993]	0.00821 [0.0101]
L.lassets	-0.0330*** [0.000703]	-0.0238*** [0.00297]	-0.0380*** [0.000911]	-0.0198*** [0.00138]	-0.0179*** [0.00311]	-0.0387*** [0.00316]
DI_SF	0.000838*** [1.43e-05]	0.000616** [0.000297]	-0.000109 [6.83e-05]	0.00316*** [0.000551]	-0.000581 [0.000559]	-0.00125 [0.000902]
grngdp	0.000880*** [5.33e-05]	0.000743*** [0.000107]	0.000978*** [7.36e-05]	0.000526*** [7.75e-05]	0.000713*** [0.000211]	0.000923*** [0.000265]
Constant	-0.0932 [0.0744]	0.0679 [0.137]	0.0296 [0.0970]	-0.288** [0.126]	-0.124 [0.273]	-0.710** [0.343]
Observations	2,883,633	267,120	1,824,763	544,394	100,646	146,710
R-squared	0.07	0.078	0.072	0.067	0.08	0.074
Number of firms	530,526	48,495	328,797	113,776	24,664	35,337

Table 4 Sales/assets

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	0.127	-0.122	0.269	1.349***	-0.608	0.248
	[0.164]	[0.296]	[0.272]	[0.273]	[0.782]	[0.541]
rage65oldersize	0.113***	0.152***	0.0845***	0.0583***	0.155***	0.165***
	[0.00765]	[0.0248]	[0.0125]	[0.00838]	[0.0419]	[0.0339]
L.lceoage	-2.774***	-0.580**	-3.045***	-1.847***	-3.420***	-1.588*
	[0.212]	[0.276]	[0.287]	[0.374]	[0.826]	[0.813]
L.lceoagesqrd	0.341***	0.0699**	0.373***	0.226***	0.431***	0.199*
	[0.0266]	[0.0346]	[0.0360]	[0.0467]	[0.103]	[0.102]
lfirmage	-0.0140***	-0.00847***	-0.0146***	-0.0319***	-0.0333***	-0.0240**
	[0.00118]	[0.00281]	[0.00142]	[0.00368]	[0.00461]	[0.0103]
lfirmagesqrd	0.000359***	0.000129***	0.000401***	0.000319***	0.000408***	0.000495***
	[1.10e-05]	[1.29e-05]	[1.95e-05]	[1.24e-05]	[3.65e-05]	[3.27e-05]
L.ebitdaA_win	-0.150***	-0.0269	-0.137***	-0.178***	-0.116**	-0.124***
	[0.00756]	[0.0230]	[0.00865]	[0.0228]	[0.0508]	[0.0307]
L.cash_win	-0.514***	-0.458***	-0.525***	-0.493***	-0.343***	-0.260***
	[0.00925]	[0.0241]	[0.0112]	[0.0220]	[0.0570]	[0.0327]
L.leverage_win	0.171***	0.173***	0.174***	0.151***	0.156***	0.153***
	[0.00470]	[0.0197]	[0.00533]	[0.0150]	[0.0351]	[0.0213]
L.slsassets_win	0.0508***	0.185***	0.0177***	0.180***	0.220***	0.121***
	[0.00201]	[0.0108]	[0.00223]	[0.00663]	[0.0112]	[0.0105]
L.rtassets_win	-1.246***	-0.740***	-1.385***	-0.783***	-0.757***	-0.662***
	[0.0113]	[0.0263]	[0.0144]	[0.0216]	[0.0602]	[0.0479]
L.lassets	-0.133***	-0.0807***	-0.177***	-0.0131	-0.0973***	-0.0724***
	[0.00421]	[0.0122]	[0.00544]	[0.00879]	[0.0212]	[0.0148]
DI_SF	0.000878***	-0.0101***	-0.00877***	-0.0307***	-0.0128***	-0.0191***
	[8.82e-05]	[0.00157]	[0.000431]	[0.00466]	[0.00302]	[0.00507]
grngdp	2.42E-05	0.000673	-0.000337	0.000913**	-0.000631	0.00275**
	[0.000272]	[0.000412]	[0.000377]	[0.000403]	[0.00111]	[0.00117]
Constant	10.30***	3.616***	10.57***	6.183***	10.06***	5.290***
	[1.004]	[0.608]	[0.576]	[0.756]	[1.711]	[1.659]
Observations	2,883,633	267,120	1,824,763	544,394	100,646	146,710
R-squared	0.048	0.101	0.044	0.089	0.126	0.063
Number of firms	530,526	48,495	328,797	113,776	24,664	35,337



Table 5 Leverage

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	0.0723	-0.0808	0.392***	0.220***	0.239	-0.415*
	[0.0595]	[0.130]	[0.104]	[0.0834]	[0.285]	[0.214]
rage65oldersize	-0.0585***	-0.0704***	-0.0835***	-0.0187***	-0.0880***	-0.0738***
	[0.00295]	[0.0117]	[0.00478]	[0.00330]	[0.0145]	[0.0145]
L.lceoage	0.214***	0.00863	0.501***	-0.163*	0.308	-0.219
	[0.0745]	[0.109]	[0.104]	[0.0924]	[0.248]	[0.389]
L.lceoagesqrd	-0.0250***	0.000519	-0.0614***	0.0224*	-0.0358	0.0299
	[0.00935]	[0.0137]	[0.0131]	[0.0115]	[0.0312]	[0.0489]
lfimage	-0.00312***	-0.000422	-0.00441***	-0.00234***	-0.0013	0.00156
	[0.000361]	[0.00114]	[0.000437]	[0.000663]	[0.00126]	[0.00380]
lfimagesqrd	2.32e-05***	1.52e-05***	4.26e-05***	5.00E-06	-8.04E-06	-1.92E-05
	[2.73e-06]	[4.86e-06]	[4.34e-06]	[3.96e-06]	[1.13e-05]	[1.33e-05]
L.ebitdaA_win	-0.161***	-0.142***	-0.157***	-0.171***	-0.146***	-0.182***
	[0.00349]	[0.0131]	[0.00392]	[0.0120]	[0.0217]	[0.0172]
L.cash_win	-0.0575***	-0.0614***	-0.0572***	-0.0420***	-0.0866***	-0.0505***
	[0.00341]	[0.0103]	[0.00412]	[0.00768]	[0.0185]	[0.0145]
L.leverage_win	0.391***	0.496***	0.378***	0.416***	0.419***	0.400***
	[0.00284]	[0.0138]	[0.00313]	[0.0109]	[0.0226]	[0.0155]
L.slsassets_win	-0.0104***	-0.00931***	-0.0114***	-0.00780***	-0.00561*	-0.0104***
	[0.000662]	[0.00310]	[0.000769]	[0.00181]	[0.00324]	[0.00343]
L.rtassets_win	-0.00929**	0.0371***	-0.0268***	0.0415***	0.0318*	-0.00777
	[0.00417]	[0.00995]	[0.00532]	[0.00799]	[0.0188]	[0.0202]
L.lassets	-0.0246***	-0.0120***	-0.0327***	-0.0121***	-0.00573	-0.0102*
	[0.00142]	[0.00416]	[0.00184]	[0.00314]	[0.00637]	[0.00609]
DI_SF	3.36E-05	-0.00073	0.000211	-0.00218**	0.000204	0.00141
	[3.03e-05]	[0.000652]	[0.000145]	[0.000971]	[0.000914]	[0.00189]
grgngdp	-0.000434***	-0.000137	-0.000564***	3.30E-05	-0.000156	-0.00022
	[0.000100]	[0.000179]	[0.000140]	[0.000131]	[0.000349]	[0.000512]
Constant	0.492***	0.563**	-0.0359	0.936***	-0.023	1.156
	[0.149]	[0.234]	[0.207]	[0.187]	[0.535]	[0.782]
Observations	2,883,633	267,120	1,824,763	544,394	100,646	146,710
R-squared	0.182	0.281	0.175	0.201	0.196	0.198
Number of firms	530,526	48,495	328,797	113,776	24,664	35,337

Table 6 Cash holding

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	0.174*** [0.0239]	0.138*** [0.0506]	0.0884** [0.0392]	0.109*** [0.0391]	0.065 [0.122]	0.0946 [0.0898]
rage65oldersize	-0.00254** [0.000993]	-0.0213*** [0.00349]	0.00446*** [0.00158]	-0.00198 [0.00130]	-6.07E-05 [0.00469]	-0.0122*** [0.00455]
L.lceoage	-0.348*** [0.0284]	-0.175*** [0.0517]	-0.506*** [0.0364]	-0.0795* [0.0420]	-0.239** [0.109]	-0.119 [0.114]
L.lceoagesqrd	0.0426*** [0.00356]	0.0212*** [0.00649]	0.0623*** [0.00457]	0.00913* [0.00526]	0.0288** [0.0137]	0.0139 [0.0143]
lfirmage	0.00114*** [0.000131]	0.000584 [0.000366]	0.00138*** [0.000156]	-0.000784** [0.000354]	5.19E-05 [0.000672]	0.000365 [0.000880]
lfirmagesqrd	-9.10e-06*** [9.87e-07]	-8.33e-06*** [2.10e-06]	-9.85e-06*** [1.50e-06]	1.48E-06 [1.63e-06]	5.36E-06 [4.64e-06]	-8.81E-07 [5.20e-06]
L.ebitdaA_win	0.0130*** [0.000733]	0.0191*** [0.00287]	0.0122*** [0.000828]	0.0124*** [0.00240]	0.0195*** [0.00450]	0.0158*** [0.00352]
L.cash_win	0.154*** [0.00123]	0.263*** [0.00474]	0.127*** [0.00142]	0.238*** [0.00358]	0.170*** [0.00796]	0.171*** [0.00554]
L.leverage_win	-0.00217*** [0.000417]	-0.00946*** [0.00171]	-0.00200*** [0.000471]	-0.00139 [0.00146]	-0.00151 [0.00279]	-0.00331 [0.00214]
L.slsassets_win	-0.00120*** [0.000167]	0.00200** [0.000878]	-0.00135*** [0.000191]	0.00117** [0.000491]	0.00316*** [0.000880]	-0.000931 [0.000897]
L.rtassets_win	-0.133*** [0.00123]	-0.105*** [0.00387]	-0.150*** [0.00152]	-0.0742*** [0.00264]	-0.0941*** [0.00716]	-0.0925*** [0.00620]
L.lassets	-0.00850*** [0.000432]	-0.000956 [0.00151]	-0.00872*** [0.000556]	-0.00779*** [0.000898]	-0.00860*** [0.00217]	-0.0153*** [0.00188]
DI_SF	0.000482*** [1.21e-05]	0.00134*** [0.000224]	0.000882*** [5.38e-05]	0.00415*** [0.000492]	0.00133*** [0.000440]	0.00172*** [0.000492]
grngdp	0.000189*** [3.54e-05]	-2.99E-05 [7.87e-05]	0.000221*** [4.78e-05]	0.000105* [6.01e-05]	0.000603*** [0.000147]	-0.000147 [0.000185]
Constant	0.981*** [0.0613]	0.525*** [0.106]	1.368*** [0.0729]	0.402*** [0.0845]	0.825*** [0.224]	0.718*** [0.230]
Observations	2,883,633	267,120	1,824,763	544,394	100,646	146,710
R-squared	0.073	0.118	0.07	0.09	0.066	0.058
Number of firms	530,526	48,495	328,797	113,776	24,664	35,337

Table 7 Investment

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	-0.512*** [0.0259]	-0.516*** [0.0632]	-0.562*** [0.0380]	-0.523*** [0.0515]	-0.695*** [0.186]	-0.872*** [0.101]
rage65oldersize	0.0619*** [0.00134]	0.0997*** [0.00516]	0.0652*** [0.00181]	0.0386*** [0.00227]	0.113*** [0.00964]	0.120*** [0.00704]
L.lceoage	0.558*** [0.0352]	0.255*** [0.0700]	0.696*** [0.0385]	0.336*** [0.0804]	0.488*** [0.188]	0.468** [0.202]
L.lceoagesqrd	-0.0710*** [0.00441]	-0.0315*** [0.00875]	-0.0888*** [0.00483]	-0.0427*** [0.0100]	-0.0620*** [0.0235]	-0.0605** [0.0253]
lfimage	0.00279*** [0.000151]	0.00220*** [0.000563]	0.00336*** [0.000177]	0.00298*** [0.000441]	0.00400*** [0.000949]	0.00392*** [0.00150]
lfimagesqrd	-4.02e-05*** [1.29e-06]	-1.97e-05*** [2.71e-06]	-5.07e-05*** [2.10e-06]	-2.75e-05*** [2.25e-06]	-3.90e-05*** [6.82e-06]	-5.38e-05*** [6.06e-06]
L.ebitdaA_win	0.0179*** [0.000896]	0.0184*** [0.00375]	0.0151*** [0.000983]	0.0285*** [0.00357]	0.0434*** [0.00746]	0.0276*** [0.00448]
L.cash_win	0.0590*** [0.00110]	0.0902*** [0.00446]	0.0498*** [0.00124]	0.0784*** [0.00350]	0.108*** [0.00928]	0.102*** [0.00549]
L.leverage_win	-0.00317*** [0.000545]	-0.0160*** [0.00275]	-0.00116** [0.000590]	-0.0129*** [0.00224]	-0.0198*** [0.00514]	-0.00881*** [0.00307]
L.slsassets_win	0.00882*** [0.000202]	0.0106*** [0.00112]	0.00921*** [0.000222]	0.00617*** [0.000676]	0.00946*** [0.00145]	0.0113*** [0.00122]
L.rtassets_win	-0.405*** [0.00180]	-0.385*** [0.00656]	-0.418*** [0.00209]	-0.374*** [0.00523]	-0.406*** [0.0128]	-0.395*** [0.0103]
L.lassets	-0.0917*** [0.000603]	-0.102*** [0.00233]	-0.0893*** [0.000707]	-0.0976*** [0.00163]	-0.130*** [0.00456]	-0.111*** [0.00291]
DI_SF	0.000179*** [1.38e-05]	0.000296 [0.000317]	0.000859*** [5.62e-05]	0.00289*** [0.000649]	0.00115* [0.000654]	0.00123 [0.000764]
grgngdp	0.000259*** [4.09e-05]	0.000239** [0.000106]	0.000298*** [5.16e-05]	3.95E-05 [9.20e-05]	0.000243 [0.000242]	0.000498** [0.000246]
Constant	0.166** [0.0818]	0.947*** [0.146]	-0.201*** [0.0777]	0.725*** [0.163]	0.835** [0.380]	0.686* [0.405]
Observations	2,883,529	267,120	1,824,680	544,378	100,640	146,711
R-squared	0.15	0.147	0.159	0.133	0.15	0.147
Number of firms	530,513	48,494	328,784	113,776	24,664	35,337

Table 8 Sales growth

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	-1.721*** [0.0567]	-1.562*** [0.134]	-1.678*** [0.0882]	-1.067*** [0.102]	-1.249*** [0.259]	-2.062*** [0.200]
rage65oldersize	0.300*** [0.00338]	0.398*** [0.0150]	0.346*** [0.00471]	0.133*** [0.00431]	0.378*** [0.0186]	0.373*** [0.0167]
L.lceoage	0.747*** [0.0702]	0.0548 [0.141]	1.293*** [0.0871]	0.109 [0.124]	-0.0797 [0.273]	0.355* [0.208]
L.lceoagesqrd	-0.0967*** [0.00881]	-0.0081 [0.0176]	-0.166*** [0.0109]	-0.0153 [0.0155]	0.00786 [0.0341]	-0.0442* [0.0262]
lfirmage	-0.000614** [0.000242]	0.00256*** [0.000904]	9.39E-05 [0.000293]	-0.00485*** [0.000916]	0.000713 [0.00112]	-0.00416* [0.00225]
lfirmagesqrd	7.98e-06*** [2.24e-06]	-2.56e-05*** [5.44e-06]	-5.88e-06* [3.23e-06]	5.85e-05*** [4.31e-06]	3.67E-07 [1.00e-05]	4.82e-05*** [1.24e-05]
L.ebitdaA_win	-0.148*** [0.00206]	-0.162*** [0.00977]	-0.141*** [0.00228]	-0.147*** [0.00757]	-0.0948*** [0.0121]	-0.180*** [0.00952]
L.cash_win	-0.189*** [0.00280]	-0.168*** [0.0112]	-0.192*** [0.00325]	-0.216*** [0.00825]	-0.127*** [0.0166]	-0.141*** [0.0116]
L.leverage_win	0.0883*** [0.00130]	0.0921*** [0.00728]	0.0875*** [0.00142]	0.0648*** [0.00534]	0.0339*** [0.00843]	0.0496*** [0.00646]
L.slsassets_win	-0.216*** [0.000599]	-0.266*** [0.00459]	-0.226*** [0.000657]	-0.194*** [0.00194]	-0.161*** [0.00292]	-0.188*** [0.00314]
L.rtassets_win	-0.153*** [0.00364]	-0.108*** [0.0121]	-0.201*** [0.00434]	-0.0658*** [0.00930]	-0.0410** [0.0195]	0.0348** [0.0176]
L.lassets	-0.385*** [0.00151]	-0.373*** [0.00710]	-0.429*** [0.00175]	-0.270*** [0.00367]	-0.367*** [0.00757]	-0.355*** [0.00656]
DI_SF	0.000968*** [3.02e-05]	0.000123 [0.000528]	0.00127*** [0.000120]	0.000996 [0.00136]	-0.00198** [0.000844]	0.0017 [0.00120]
grgngdp	0.00219*** [0.000109]	0.00283*** [0.000263]	0.00210*** [0.000147]	0.00187*** [0.000197]	0.000959** [0.000379]	0.00281*** [0.000518]
Constant	3.884*** [0.253]	5.239*** [0.296]	3.020*** [0.174]	3.950*** [0.251]	5.030*** [0.557]	4.405*** [0.426]
Observations	2,883,667	267,122	1,824,786	544,397	100,649	146,713
R-squared	0.241	0.249	0.258	0.182	0.229	0.216
Number of firms	530,528	48,495	328,797	113,776	24,665	35,338

Table 9 Asset growth

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	-1.836*** [0.0541]	-1.512*** [0.120]	-1.915*** [0.0871]	-1.663*** [0.0933]	-1.245*** [0.264]	-2.044*** [0.191]
rage65oldersize	0.283*** [0.00299]	0.341*** [0.0116]	0.350*** [0.00430]	0.129*** [0.00379]	0.320*** [0.0169]	0.330*** [0.0140]
L.lceoage	2.149*** [0.105]	0.637*** [0.117]	2.771*** [0.0911]	1.296*** [0.272]	1.241*** [0.265]	1.379*** [0.485]
L.lceoagesqrd	-0.271*** [0.0132]	-0.0795*** [0.0147]	-0.350*** [0.0114]	-0.163*** [0.0340]	-0.158*** [0.0331]	-0.174*** [0.0608]
lfirmage	0.00557*** [0.000320]	0.00747*** [0.00103]	0.00552*** [0.000393]	0.00917*** [0.000883]	0.0119*** [0.00140]	0.0110*** [0.00296]
lfirmagesqrd	-0.000135*** [3.64e-06]	-9.41e-05*** [5.16e-06]	-0.000148*** [6.50e-06]	-9.42e-05*** [4.21e-06]	-0.000143*** [1.13e-05]	-0.000203*** [1.16e-05]
L.ebitdaA_win	-0.0209*** [0.00187]	-0.0221*** [0.00750]	-0.0221*** [0.00210]	0.00984 [0.00668]	0.00428 [0.0128]	-0.011 [0.00874]
L.cash_win	0.0458*** [0.00244]	0.0199** [0.00870]	0.0556*** [0.00287]	0.0268*** [0.00657]	-0.0369** [0.0156]	-0.0208** [0.0103]
L.leverage_win	-0.0264*** [0.00116]	-0.0512*** [0.00576]	-0.0283*** [0.00130]	-0.0508*** [0.00448]	-0.0405*** [0.00887]	-0.0342*** [0.00585]
L.slsassets_win	0.0416*** [0.000442]	0.0425*** [0.00229]	0.0376*** [0.000493]	0.0424*** [0.00135]	0.0355*** [0.00240]	0.0442*** [0.00240]
L.rtassets_win	0.287*** [0.00311]	0.126*** [0.00944]	0.315*** [0.00381]	0.179*** [0.00748]	0.115*** [0.0174]	0.166*** [0.0154]
L.lassets	-0.414*** [0.00139]	-0.375*** [0.00470]	-0.448*** [0.00166]	-0.343*** [0.00336]	-0.373*** [0.00786]	-0.397*** [0.00563]
DI_SF	0.000574*** [2.85e-05]	0.00401*** [0.000594]	0.00414*** [0.000137]	0.0127*** [0.00130]	0.00307*** [0.000978]	0.00769*** [0.00150]
grngdp	0.00141*** [8.26e-05]	0.00123*** [0.000182]	0.00153*** [0.000111]	0.000894*** [0.000147]	0.00115*** [0.000337]	0.00128*** [0.000405]
Constant	0.631*** [0.212]	3.599*** [0.245]	-0.367** [0.183]	1.816*** [0.542]	2.069*** [0.545]	2.475** [0.968]
Observations	2,883,664	267,122	1,824,785	544,397	100,649	146,711
R-squared	0.284	0.243	0.3	0.242	0.26	0.28
Number of firms	530,525	48,495	328,796	113,776	24,665	35,336

Table 10 Young Firm (probit; if firm age $\leq$ 5, otherwise 0)

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	-2.053*** [0.0718]	-1.445*** [0.327]	-1.330*** [0.1000]	-2.309*** [0.133]	-5.427*** [0.321]	-4.264*** [0.236]
DI_SF	0.00280*** [0.000229]	-2.07E-05 [0.00199]	0.00280*** [0.000302]	0.0266*** [0.00261]	0.00601** [0.00234]	0.00083 [0.00160]
grgngdp	-0.000572 [0.000611]	0.000329 [0.00276]	-0.00228*** [0.000795]	0.00364*** [0.00124]	-0.00466 [0.00285]	0.00305 [0.00247]
Constant	-1.551*** [0.0205]	-1.674*** [0.0812]	-1.383*** [0.0264]	-1.353*** [0.0389]	0.0148 [0.125]	-0.348*** [0.0745]
Observations	3,373,963	288,586	1,981,463	806,175	114,327	183,412
Pseudo R2	0.0131	0.0017	0.0014	0.00382	0.0158	0.0108
Log pLik	-613835	-30247	-334052	-166951	-28656	-53014

Table 11 CEO age

VARIABLES	All	Manufacturing	Construction	Wholesale	Retail	Service
rage65older	6.014*** [1.734]	1.977 [5.974]	6.114** [2.488]	4.958 [3.564]	-0.878 [10.26]	-1.542 [5.061]
rage65oldersize	-1.239*** [0.0598]	-1.846*** [0.318]	-1.623*** [0.0846]	-0.424*** [0.0902]	-0.197 [0.368]	-0.688*** [0.231]
lfirmage	0.266*** [0.00673]	0.257*** [0.0382]	0.229*** [0.00755]	0.359*** [0.0271]	0.339*** [0.0523]	0.472*** [0.0886]
lfirmagesqrd	-0.00393*** [8.62e-05]	-0.00233*** [0.000246]	-0.00337*** [0.000114]	-0.00483*** [0.000171]	-0.00398*** [0.000412]	-0.00623*** [0.000361]
L.ebitdaA_win	0.257*** [0.0204]	1.039*** [0.137]	0.188*** [0.0223]	0.508*** [0.0748]	0.432*** [0.154]	0.411*** [0.0740]
L.cash_win	-0.526*** [0.0391]	-1.089*** [0.242]	-0.478*** [0.0436]	-0.880*** [0.127]	-0.724*** [0.267]	-0.365*** [0.141]
L.leverage_win	0.204*** [0.0137]	0.498*** [0.0927]	0.179*** [0.0152]	0.195*** [0.0459]	0.303*** [0.110]	0.262*** [0.0492]
L.slsassets_win	-0.0630*** [0.00504]	-0.162*** [0.0406]	-0.0615*** [0.00558]	-0.0857*** [0.0175]	-0.0379 [0.0323]	-0.0244 [0.0204]
L.rtassets_win	0.106** [0.0538]	0.499 [0.316]	0.0676 [0.0611]	-0.0794 [0.152]	-0.283 [0.388]	0.086 [0.209]
L.lassets	0.0212 [0.0181]	0.0827 [0.0977]	-0.016 [0.0219]	-0.00421 [0.0436]	0.0877 [0.109]	0.170*** [0.0628]
DI_SF	0.0152*** [0.00107]	0.0957*** [0.0245]	0.0905*** [0.00329]	0.414*** [0.0407]	0.170*** [0.0363]	0.174*** [0.0440]
grgngdp	0.00297** [0.00147]	-0.00862 [0.00594]	0.00313* [0.00174]	0.00483 [0.00362]	0.0157** [0.00787]	0.000481 [0.00686]
Constant	52.11*** [0.492]	52.69*** [2.330]	54.60*** [0.712]	50.26*** [1.058]	57.09*** [4.491]	53.63*** [3.654]
Observations	2,952,993	271,250	1,866,628	558,879	104,086	152,150
R-squared	0.078	0.016	0.098	0.06	0.055	0.111
Number of firms	547,256	49,339	338,236	118,498	25,862	36,892

## Appendix Variable definitions

rage65older	the perfecture share of population aged 65 or older
rage65oldersize	the perfecture share of population aged 66 or older*ln(number of employees)
ceoage	CEO age
fceoage	Firm age
firmage	Successor CEO age
lceoage	ln(CEO age)
lceoagesqrd	squared ln(CEO age)
lfirmage	ln(firm age)
lfirmagesqrd	squared ln(firm age)
ebitdaA_win	EBITDA/assets
cash_win	CASH/assets
leverage_win	Liabilities/assets
slsassets_win	Sales/assets
rtassets_win	Tagiable assets/assets
lassets	ln(assets)
DI_SF	the difusion index of short term borrowing for small firms
grgngdp	Perfecture growth of GDP