The Role of Mandatory Director Retirement Policies in Corporate Governance

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Abstract: We construct a unique dataset on mandatory retirement policies for independent directors at U.S. public firms from 1994 to 2020 by combining machine learning techniques with manual inspections. We investigate factors that drive firms to adopt mandatory retirement policies and assess the value implications of such decisions. We document an increasing trend in policy adoption, particularly among S&P 1500 firms. Our results indicate that firms with greater monitoring needs are more likely to implement mandatory retirement policies, while those with greater advising needs are less likely to do so. Moreover, mandatory retirement policies are associated with an increase in firm value when monitoring benefits are high but a decrease in value when advising benefits are high. This study is the first to examine both the determinants and outcomes of mandatory retirement policies, suggesting that their value effect depends on firms' specific governance needs.

JEL classifications: D22; C81; G30; G34

Keywords: Corporate governance, Board of Directors, Board monitoring role, Mandatory retirement policy, Sarbanes-Oxley, SOX, Endogeneity, Machine learning

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1 Introduction

Given the vital role of the board of directors in modern corporations, academic literature has extensively examined ideal board structures, focusing on aspects such as board size, independence, CEO-chairman duality, and the use of classified boards (e.g., Adams and Ferriera, 2007; Raheja, 2005; Linck, Netter, and Yang, 2008; Guernsey, Guo, Liu, and Serfling, 2024). This paper contributes to this literature by investigating the determinants and consequences of an important yet under-researched board characteristic: the mandatory retirement policy for independent directors. This policy sets a specific age at which non-employee directors are required to retire.[1] Proponents argue that mandatory retirement policies foster board refreshment, encourage diversity, and facilitate the infusion of new perspectives and ideas. However, critics contend that such policies may force experienced and knowledgeable directors to step down, potentially resulting in a loss of valuable expertise and raising concerns of age discrimination.

Despite ongoing debate, mandatory retirement policies have gained popularity over time.[2] In this paper, we aim to provide insights into the prevalence, costs, and benefits of this controversial policy for board of directors at U.S. firms. Specifically, we investigate two main research questions: (1) which firm characteristics are associated with the adoption of a mandatory retirement policy and (2) whether and how the mandatory retirement policy affects firm value. Addressing these questions extends the literature by offering a more comprehensive understanding of how firms can achieve an optimal board structure.

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[1] The age threshold for mandatory retirement policies varies by company but is typically set between 65 and 75.
[2] According to a survey by Shearman & Sterling in 2023, the mandatory retirement policy is popular among big firms. For example, 69 of the Top 100 Companies have disclosed that they have implemented the mandatory retirement policy. See https://digital.shearman.com/i/1512772-2023-corporate-governance-survey/

The primary obstacle in studying mandatory retirement policies in U.S. public firms is the lack of coverage by commercial databases. To date, we are unaware of any commercial database that provides this data to academic researchers. To address this challenge, we construct a new, comprehensive dataset capturing mandatory retirement policy status and age thresholds for publicly traded firms from 1994 to 2020. We generate this dataset using a popular machine learning technique, the Random Forests (RF) Classifier, combined with textual analysis and manual inspection. Specifically, we integrate the analysis of firms' SEC filings with the Random Forests (RF) Classifier to predict if a company enforces mandatory retirement policy in a given year. The RF Classifier is a well-established technique commonly applied across various scientific fields, though it is still relatively new in financial academic research (Varian, 2014). [3] The RF Classifier develops several decision trees, where each tree bootstraps the observations in the training set and randomly chooses a subset of predictors at each decision point to maximize the growth of the tree. Each tree produces a classification, and the forest then selects the classification with the highest accuracy.

To implement our machine learning model, we first create a training sample by randomly selecting 300 firms from Compustat. For these firms, we obtain company filings (i.e., DEF 14A, 10K, 10Q, 8K, 6K, 20F, S1) from the SEC Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database for four years and extract more than 70,000 sentences related to "age," "retirement," "birthday," and similar terms from their SEC filings. We then manually read through these 70,000 sentences and determine whether each sentence indicates the firm has established a mandatory retirement policy. Next, we use 80% of these manually classified sentences as a training

[3] In the accounting and finance field, the papers use RF include Guernsey, Guo, Liu, and Serfling (2024) and Frankel, Jennings, and Lee (2022).

sample to estimate the model's parameters, with the remaining 20% serving as a testing sample. Our model achieves an initial out-of-sample prediction accuracy rate exceeding 99.8% for predicting the mandatory retirement policy. In the final step, we obtain company filings for all U.S. public companies from 1994 to 2020 and apply our RF Classifier to predict the mandatory retirement policy across this comprehensive sample. Our final dataset contains 117,761 firm-year observations.

Using our unique dataset, we begin the analysis by documenting an increasing trend of the mandatory retirement policy, particularly among index firms. At the beginning of the sample period, or the mid-1990s, 11.9% of S&P 1500 firms developed mandatory retirement policy, and this ratio has increased to 58.2% in 2020. Additionally, we document that the mandatory retirement policy is common across industries, although there are variations, with Chemical and Manufacturing industry having the highest percentages, and Healthcare and Business Equipment having the lowest percentages of firms adopting the policy.

The increased adoption of mandatory requirement policies does not necessarily equate to effective enforcement. To evaluate the impact of such policies, we examine the relation between firm age and the average age of directors. Specifically, we compare trends in firms that have implemented age limits for directors with those that have not. We show that, in firms with mandatory requirement policies, the age and tenure of independent directors do not rise as quickly with the firm's age compared to firms without these policies. This observation is also supported by anecdotal evidence: for instance, long-serving directors Al Gore, with a twenty-one-year tenure, and James Bell, with nine years of service, departed from Apple Inc. in 2024 upon reaching the age of 75.[4]

[4] https://www.cnbc.com/2024/01/11/apple-longtime-directors-al-gore-and-james-bell-retiring-from-board.html

After demonstrating the effectiveness of the mandatory requirement policy, we turn to examining the factors that drive their adoption. We hypothesize that the benefits of monitoring play a crucial role in a firm's decision to implement such policies. Monitoring is a key responsibility of the board of directors (Adams and Ferreira, 2007; Raheja, 2005), and mandatory retirement policies may enhance the effectiveness of this monitoring function. Prior research suggests that older adults may experience diminished perceptual abilities, potentially impacting their capacity to effectively monitor and respond to relevant information (Lindenberger and Baltes, 1994; Li and Lindenberger, 1999). Additionally, Ferris, Jagannathan, and Pritchard (2003) contend that older directors may have lower energy levels, pose a last-period risk, and view board positions as attractive part-time roles in retirement, which could reduce their monitoring incentives. Therefore, we anticipate that firms which find monitoring to be beneficial (and thus costly) will be more likely to adopt mandatory retirement policies, while those for whom monitoring is less critical will be less inclined to do so.

Another key role of the board of directors is to advise managers (Mace, 1986), and older directors may be particularly well-suited for this role. With decades of industry experience, they offer valuable insights and strategic guidance that can be instrumental for management. Additionally, their extensive professional networks can provide crucial support and resources, further enhancing their ability to advise and assist the management team effectively (Masulis, Wang, Xie, and Zhang, 2023). Therefore, we expect that firms that gain greater benefits from director advising will be less likely to implement mandatory director retirement policies.

We follow the literature to construct proxies for monitoring benefits and advising needs. Using principal component analysis, we extracted the monitoring benefits and advising needs factors based on the firm monitoring and advising-related characteristics (Boone, Casares Field, Karpoff, and Raheja, 2007; Coles, Daniel, and Naveen, 2008; Linck, Netter, and Yang, 2008). Results report that monitoring benefits (advising needs) are positively (negatively) associated with imposing the mandatory retirement policy. Moreover, we identify the channels through which monitoring benefits and advising needs impact the imposition of the mandatory retirement policy.

Furthermore, we explore the impact of joining the S&P 1500 index and passing the Sarbanes-Oxley Act (SOX) in 2002 on implementing the mandatory retirement policy because both have implications for corporate governance. Getting indexed leads to more institutional owners and attracts the media's attention, scrutinizing how the firm is governed. Additionally, the U.S. Congress passed the SOX to improve corporate governance and protect investors from fraud. Results show that in high levels of monitoring benefits, firms indexed in S&P 1500 tend to impose mandatory retirement policy compared to those not indexed firms. On the contrary, S&P 1500 firms are less likely to impose mandatory retirement policy, compared to those not in the S&P 1500 index, when they have higher advising needs. Moreover, in the years after SOX, firms with high monitoring benefits (advising needs) are more (less) likely to develop a mandatory retirement policy. We identify the channels through which indexing and SOX affect the mandatory retirement policy in each case.

Moreover, we examine the relation between various firm life cycle stages, as defined by Dickinson (2011), and the mandatory retirement policy since corporate governance practices are adaptive and evolve according to the firm's specific requirements at different stages. In this context, our findings indicate that the mature and shake-out–more stable stages–are positively and significantly correlated with the imposition of mandatory retirement policy compared to the introduction stage. We also conduct a difference-in-difference analysis to find the firms' tendency to impose a mandatory retirement policy after a sudden CEO death. We find that firms are unlikely to impose a mandatory retirement policy three years after a CEO passes away while in the office. This tendency might be related to the idea that, after the CEO's death, experienced directors became more valuable to the firm, which increases the advising needs of the firm, and it is reasonable that firms would not implement a mandatory retirement policy that forces them to resign.

Lastly, we investigate whether and how mandatory retirement policies affect firm value. First, we analyze the relationship between mandatory retirement policies and firm value in a cross-sectional framework. Using Ordinary Least Squares (OLS) with industry and year fixed effects, we find that, on average, mandatory retirement policies are negatively associated with firm value, as measured by Tobin’s Q. However, when we examine this relationship in a time-series context, incorporating firm and year fixed effects, we observe a positive association between mandatory retirement policies and firm value. These time-series results suggest that the decision to adopt a mandatory retirement policy may be associated with an ex ante lower firm value. For example, our determinants model shows firms with strong advising needs and those in the growth stage, presumably with higher firm value, are less likely to adopt mandatory retirement policies, while firms with strong monitoring needs and those in the mature or shake out stage, presumably with lower firm value, are more inclined to implement such policies. This reverse causality may explain this striking difference between the cross-sectional and time-series results.

To strengthen the causal interpretation of our time-series findings, we employ an instrumental variable approach, following Karpoff, Schonlau, and Wehrly (2017). Our instrument leverages the prevalence of mandatory retirement policies at geographically proximate firms in different industries during prior years. Using this instrument, we continue to find a positive association between mandatory retirement policies and firm value in the time series. However, it is important to interpret these instrumental variable results with caution, as they rely heavily on the validity of the instrument, which may be imperfect.

To further explore how mandatory retirement policies affect firm value, we examine their relationship across different levels of monitoring and advising benefits. The results indicate a significant positive association between firm value and mandatory retirement policies in firms with high monitoring benefits, and a significant negative association in firms with high advising benefits. Consistent with our determinants model, these findings suggest that adopting a mandatory retirement policy is advantageous for firms with greater monitoring needs but detrimental for firms where advising needs are more pronounced.

We make three main contributions to the literature and practice. First, our paper advances the literature on determinants of board structures. Prior studies have examined various aspects of optimal board design, including board size, board independence, CEO duality, and the use of classified boards (e.g., Adams and Ferreira, 2007; Raheja, 2005; Linck, Netter, and Yang, 2008; Guernsey, Guo, Liu, and Serfling, 2024). To the best of our knowledge, this is the first empirical investigation into the determinants of mandatory retirement policies for independent directors.

Second, our paper relates to the literature examining how board structure affects the way in which firms function and how they perform (Bebchuk and Cohen, 2005; Faleye, 2007; Adams, Hermalin, and Weisbach, 2010; Cremers, Litov, and Sepe, 2017; Johnson, Karpoff, and Yi, 2015 and 2022; Guernsey, Guo, Liu, and Serfling, 2024). Despite ongoing debates regarding the use of mandatory retirement policies, no study has systematically examined their prevalence, costs, and benefits, presumably due to data limitations. While anecdotal evidence suggests that most large and established firms adopt these policies, significant debate persists about their effectiveness. Our findings indicate that the value of mandatory retirement policies may depend on firm-specific characteristics: they are more beneficial for firms with high monitoring needs but may harm firm value when advising needs are substantial. Consistent with Cremers, Litov, and Sepe (2017), our results also underscore the importance of addressing reverse causality when examining the relationship between board characteristics and firm performance.

Lastly, we add to the expanding literature on the use of machine learning in constructing novel datasets that provide more accurate representations of sample populations. Following the approach of Guernsey, Guo, Liu, and Serfling (2024) and Miric, Jia, and Huang (2023), we combine manual labeling of a training sample with machine learning techniques to a large-scale and comprehensive database capturing the adoption of mandatory retirement policies among all publicly traded firms from 1994 to 2020.

In subsequent sections, we develop the hypothesis, describe the data, and outline the methodology used to determine if the board has a mandatory retirement policy. We also summarize the sample and data, present the study's main findings, detail additional tests, and conclude with the overall results.

2 Hypothesis Development

The literature documents that one of the most important functions of independent directors is to monitor senior management to effectively protect the interests of shareholders (Jensen, 1993). Over the past three decades, the need for stronger board monitoring has grown, especially after major corporate scandals like Enron and WorldCom in the early 2000s (Wintoki and Xi, 2019). These scandals exposed serious gaps in corporate oversight, leading to widespread calls for more stringent governance practices. In response, significant reforms were introduced, including the Sarbanes-Oxley Act of 2002 (SOX), which emphasized director independence, enhanced qualifications, and greater accountability. These changes, along with increased pressure from shareholders, have significantly expanded the role of the board, especially for independent directors, making their job more demanding and time-consuming, with a strong focus on preventing misconduct and ensuring compliance with regulations.

In recent years, corporate boards have been relying more on older directors because there aren't enough qualified executives available. Companies are under pressure to find independent directors with the right experience and expertise, which has led them to increasingly choose from an older pool of candidates (Masulis, Wang, Xie, and Zhang, 2023).[5] As firms rely more heavily on older directors due to this constrained supply, concerns arise regarding the potential impact of age-related cognitive decline on their ability to perform effectively. Research by Craik, Moscovitch, and McDowd (1994) indicates that older adults may struggle with tasks requiring the recall of surface-level details, particularly in explicit memory tasks. This suggests that as directors age, they might experience difficulties in encoding and retrieving critical information, which could impair their decision-making capabilities and overall performance, especially in the high-pressure environment of corporate governance.

Mandatory board retirement policies help mitigate these risks by ensuring that directors do not serve beyond the point where age-related cognitive decline could compromise their effectiveness. Such policies can facilitate the regular infusion of fresh perspectives and energy into the boardroom while maintaining a balance between experience and cognitive agility, ultimately supporting the board's ability to oversee management and safeguard shareholders' interests effectively. In this paper, we argue that the quality of monitoring by the board of directors will be

[5] As documented in Masulis, Wang, Xie, and Zhang (2023), this trend is reflected in the rising median age of independent directors, which increased from 61 to 64 between 1998 and 2014 among large U.S. firms. Moreover, the proportion of companies with a majority of independent directors aged 65 or older nearly doubled during this period, climbing from 27% to 50%.

enhanced if a firm imposes mandatory retirement by age for independent directors. Based on the Harvard Corporate Governance Forum, 70 percent of S&P 500 and 40 percent of Russell 3000 firms adopted the mandatory retirement policy in 2018. [6]

Prior literature suggested that the composition of a firm's board of directors is shaped by the specific demands of its business environment and the type of information it needs to function effectively (Boone, Casares Field, Karpoff, and Raheja, 2007; Demsetz and Lehn, 1985; Gillan, Hartzell, and Starks, 2003). Research by Raheja (2005) and Harris and Raviv (2008) highlights that the benefits of board monitoring increase when managers have greater opportunities to pursue private gains, which may not align with shareholders' interests. We suggest that firms are more likely to adopt mandatory retirement policies for their directors when the benefits of monitoring are high. This leads to our first hypothesis:

Hypothesis 1: Firms are more (less) likely to impose mandatory retirement policies for their independent directors when the benefits of board monitoring is high (low).

Advising managers is the other primary function of the board of directors (Mace, 1986), and older directors may be particularly qualified for this role. Their deep knowledge of the sector and familiarity with the evolving market dynamics make them a critical asset in navigating complex challenges. Additionally, their extensive professional networks, often built over the course of long careers, can provide crucial support and access to external resources, fostering business opportunities, partnerships, and strategic alliances that are invaluable for a firm's growth and sustainability (Masulis, Wang, Xie, and Zhang, 2023). Furthermore, older directors often possess a level of wisdom and judgment that comes from managing through different business cycles, allowing them to offer balanced perspectives in decision-making processes. Therefore, we

[6] https://corpgov.law.harvard.edu/2022/08/25/board-refreshment-and-evaluations/

expect that firms that stand to benefit more from director advising are less likely to implement mandatory director retirement policies, as doing so would mean losing access to this wealth of knowledge and experience. This leads to our second hypothesis:

Hypothesis 2: Firms are less (more) likely to impose mandatory retirement policies for their independent directors when the advising need is high (low).

The impact of mandatory retirement policies on firm value is unclear, a priori. On the one hand, adding more younger directors can rejuvenate the board's composition, potentially enhancing its ability to monitor management effectively. On the other hand, mandatory retirement policies that force experienced directors off the board could weaken its advisory capacity. Older directors often possess decades of industry knowledge, deep firm-specific insights, and extensive professional networks. Their experience in handling different business cycles and market shifts makes them particularly valuable in advising on long-term strategies. Given these two different predictios on the association between mandatory retirement policies and firm value, we state our third hypothesis in the null form:

Hypothesis 3: There is no association between mandatory retirement policies and firm value.

3 Data and Methodology

3.1 Data sources

In this paper, we utilize multiple data sources. Our baseline sample is derived from the CRSP-Compustat merged database, covering the sample period from 1994 to 2020. We use Compustat to gather accounting and segment data and the CRSP database to gather stock return information. Board-level details are sourced from BoardEx, analyst-related data from IBES, and institutional ownership data from Thomson Reuters Institutional (13f). The classified board data used in this study is provided by Guernsey, Guo, Liu, and Serfling (2024).

3.2 Methodology and machine learning (EDGAR available data)

3.2.1 Overview of Random Forests (RF) Classifier

The Random Forest (RF) algorithm is a supervised machine-learning approach for making predictions built upon decision trees. The RF Classifier consists of a set of prediction trees, serving as an enhanced classification method compared to the standard decision tree models introduced by Breiman (2001) and later implemented by Liaw and Wiener (2002). The RF Classifier boasts several key advantages over traditional models. Firstly, it is grounded in the bagging (bootstrapping + aggregating) algorithm and employs an ensemble learning technique. This allows the RF Classifier to generate numerous trees based on subsets of data and amalgamate the outcomes from all trees. Bootstrapping ensures that each tree is trained on a different subset of the data by randomly sampling with replacement. This process reduces the model's reliance on the specific patterns in the original training data. Secondly, instead of a single tree that examines all features simultaneously and presents only one path, the RF Classifier constructs multiple trees with random features. This approach helps decrease the correlation between individual trees, improving model efficiency and mitigating the high variance problem. Lastly, the RF Classifier does not necessitate parametric assumptions about the functional form between predictors and outcomes.

The RF Classifier method has been effectively employed across various scientific disciplines and, more recently, in the realms of economics and business. For instance, the RF Classifier surpasses other statistical instruments in predicting future ecological shifts, offers the most precise forecasts of chemical compound classifications, attains a high level of accuracy in 3D object recognition, and exhibits superior properties in predicting microarray data (Díaz-Uriarte and de Andrés, 2006; Prasad, Iverson, and Liaw, 2006; Svetnik et al., 2003; Shotton et al., 2013).

In the field of economics, Varian (2014) supports the utilization of RF in econometrics, and Bajari, Nekipelov, Ryan, and Yang (2015) apply RF to estimate demand functions. Most recently, Frankel, Jennings, and Lee (2022) argue that RF algorithms more accurately capture disclosure sentiment than alternative machine learning methods. Furthermore, Guernsey, Guo, Liu, and Serfling (2024) use the RF Classifier as a new approach to predict whether firms have classified (staggered) boards.

3.2.2 Estimation steps and machine learning prediction

Creating a training sample is necessary to implement the machine-learning algorithm. We first randomly selected 300 firms from Compustat that were covered by the SEC EDGAR database from 2013 to 2016 and obtained approximately 72,030 sentences related to "age," "retirement," "birthday," etc. from their SEC filings. We manually read through these 72,030 sentences and identify whether the sentence indicates the firm has a mandatory retirement policy. Among these 72,030, we can identify 836 sentences related to the mandatory retirement policy. We remove stop words from the text for each sentence and reduce each word to its stem using the Porter stemmer technique. We convert this text into unigrams and bigrams (one- and two-word phrases) that indicate whether the specific phrase appears at least once and includes only phrases. We use 80% of these sentences as the training sample and the remaining 20% as the out-of-sample test dataset. Following Frankel, Jennings, and Lee (2022), we use 5,000 trees to predict the sentences indicating the mandatory retirement policy using the training sample and the remaining 20% to evaluate the model. We classified the sentence as mandatory retirement policy-related for the remaining 20% of sentences when the predicted probability is greater than 50% and zero otherwise. The out-of-sample prediction accuracy is around 99.8%. It is worthwhile to mention that the false positive rate (predicted as having the mandatory retirement policy but actually does not have the mandatory retirement policy) is 0%, and the false negative rate (predicted as having the mandatory retirement policy but actually not having mandatory retirement policy) is 15.7%. To achieve a 0% false negative rate, we need to set the cutoff to 10%. This is not surprising, given that only 1.1% of the training sample sentences are mandatory retirement policy-related. We perform several steps to mitigate the possibility of a false negative in the final sample.

For the rest of the population, we obtain approximately 5.5 million sentences related to "age," "retirement," and "birthday," etc., from their SEC filings and utilize the same model that has been generated from the training sample. In the first step, we classified the sentence as mandatory retirement policy-related when the predicted probability exceeds 50%. As mentioned, we kept all sentences with a predicted probability greater than 10% (68,266 sentences) and did a manual classification to mitigate the potential false negative issues. We can identify 2,024 firms with mandatory retirement policy-related adopted within the sample period.

We assume that the first year a mandatory retirement policy is detected for a firm is the year it was adopted. However, if the policy is not detected in a particular year, this does not necessarily mean that the firm has discontinued the policy. In such cases, we examine previous years to see if the policy was detected earlier. If it was, we assume the policy is still in effect in the current year, even if it's not explicitly mentioned, possibly because the firm does not reference it annually. This assumption is based on the observation that removing a mandatory retirement policy was very uncommon during the hand-collection process. In summary, once the mandatory retirement policy dummy is set to one, it is carried forward in subsequent years.

3.3 Sample Overview

Table 1 outlines the construction of the mandatory retirement policy sample. Initially, we begin with 174,131 firm-year observations from the merged CRSP-Compustat dataset. Due to missing the Central Index Key (CIK) or Standard Industrial Classification (SIC) data, 4,824 observations are excluded, and two observations are removed because of duplicate entries in LPERMNO and fiscal year variables. Furthermore, financial and utilities firms (SIC 6000-6999 and SIC 4900-4949) were omitted from the dataset due to their unique regulatory requirements, reducing the number of firm-year observations to 117,761. Finally, limitations imposed by the various datasets used to create our primary dataset further decrease the number of observations to 67,611, encompassing 8,423 unique firms.

Figure 1 (Panel A of Table 2) displays the percentage of firms that impose mandatory retirement policies between 1994 and 2020 across S&P 1500 firms and non-indexed companies (all firms in the dataset). The data shows an increasing trend in mandatory retirement policies among all firms, from 2.8% to 26.5%, between 1994 and 2020. The impact of joining the S&P indices is apparent: 11.9% of indexed firms (S&P 1500) implemented mandatory retirement policies in 1994, increasing to 58.2% by 2020. On the other hand, in 1994, only 0.8% of non-indexed firms adopted mandatory retirement policies, which rise to 14.0% by 2020.

To assess whether the increased adoption of mandatory retirement policies translates into effective enforcement, we analyze the relationship between firm age and the average age of directors. Figure 2 presents a comparison of trends between firms that have implemented age limits for directors and those that have not. Our findings reveal that, in firms with mandatory retirement policies, the age and tenure of independent directors increase at a slower pace relative to the firm's age compared to firms without such policies. This indicates that mandatory retirement policies effectively mitigate the upward trend of director age and tenure typically observed as firms grow older.

Figure 3 and Panel B of Table 2 illustrate the distribution of firms that have adopted mandatory retirement policy across the Fama-French 12 industry categories. These industry categories classify companies into 12 distinct sectors based on their primary business activities. Notably, 33.7% of firms in the Chemicals sector implement mandatory retirement policies, 5.7% more than the next highest category, Manufacturing. The Healthcare (10.2%) and the Business Equipment (11%) sectors have the lowest percentages of firms adopting this policy.

Figure 4 shows a notable increase in the adoption of mandatory retirement policies following the enactment of SOX in 2002. We further decompose the trends in usage of mandatory retirement policies among firms in the S&P 500 (Big-Cap), 400 (Mid-Cap), and 600 (Small-Cap) Indices and those not included in the Indices. The impact of firm size on the presence of mandatory retirement policies on indexed firms is evident in this figure. The proportion of firms with mandatory retirement policies is highest among S&P 500 (Big-Cap) companies, followed by S&P 400 (Mid-Cap) firms, and lowest among S&P 600 (Small-Cap) firms.

The data in Table 3 presents descriptive statistics for various variables from 1994 to 2020. According to Table 3, Tobin's Q has an average value of 2.21 and a median value of 1.56. The sample firms have an average age of 12.68 years and a median of 9 years. The mean institutional ownership for the sample is 38.2%, and the median number of business segments is 3. The median board size of the companies in the sample is 8, with 46.0% having a classified board structure. The ratio of independent directors to the total number of board members has a mean value of 67.4%.

4 Empirical analyses

4.1 The role of monitoring benefits and advising needs on the mandatory retirement policies

We develop our proxies for monitoring benefits by drawing on established frameworks from several key studies, each of which proposes firm-specific characteristics as effective proxies for these factors. Following prior studies, we utilize three variables as proxies for monitoring benefits. Prior studies (Linck, Netter, and Yang, 2008) argue that the monitoring benefits will be higher if insiders have a greater opportunity to extract more private benefits. The first variable we use to proxy for monitoring benefits is *free cash flow*, as Jensen (1986) argues, free cash flow exacerbates agency conflicts, as managers may prioritize using these funds for personal gain instead of maximizing shareholder value. The second variable we use to proxy for monitoring benefits is *industry concentration*. According to Gillan, Hartzell, and Starks (2003), firms that dominate their markets face less competitive pressure, and, as a result, their managers might find it easier to secure private benefits than managers in fiercely competitive sectors. In addition, Linck, Netter, and Yang (2008) argue that the benefits of effective monitoring will increase with a firm's complexity. Following their argument, our last proxy of monitoring benefits is the proportion of *debt* in the capital structure.

Coles, Daniel, and Naveen (2008) state that advising benefits grows as a firm's operating complexity increases. In this context, we use operating complexity as a proxy for a firm's need for advising. Among many different variables, we use two commonly used measures of operating complexity to create a proxy for the firm's advising needs (benefits): *asset intangibility* and *R&D expenditures*. Due to their inherent characteristics, intangible assets and R&D expenditures are associated with higher levels of uncertainty. This uncertainty introduces greater information complexity as it becomes more difficult for directors and other stakeholders to assess the value of intangible assets and the payoff of R&D expenditures accurately. In this vein, asset intangibility and R&D expenditures can serve as a proxy for operating complexity and advising benefits (e.g., Coles, Daniel, and Naveen, 2008; Faleye, Hoitash, and Hoitash, 2011; Gomes, Gorton, and Madureira, 2007; Loughran and McDonald, 2023).

Table 4 examines the relation between the mandatory retirement policy and the monitoring and advising-related characteristics.[7] The dependent variable, mandatory retirement policy, is an indicator variable equal to 1 if a firm imposes an age limit for non-executive directors and 0 otherwise. In the first five columns of Table 4, we sequentially include variables related to the monitoring benefits (free cash flow, debt, and industry concentration) and the advising benefits (asset intangibility and R&D expenditure) while controlling for return on assets, number of analysts capturing the firm, institutional ownership percentage, independence ratio, board size, CEO-chairman duality indicator, CEO retirement indicator (equal to 1 if the CEO is over 65), and classified board indicator. In Column (6), we add all monitoring and advising benefits-related variables to the model. In column (7), we incorporate additional variables that are proxies for the firm's complexity and diversification (firm size, firm age, number of business segments) into the model.[8] We also show that our results are consistent if we use a Probit model (Column (8)). Year and industry fixed effects are included in all columns of Table 4. Consistent with our main hypothesis, variables related to monitoring benefits are positively and significantly associated with the mandatory retirement policy, while those related to advising benefits are negatively and

[7] All control variables in all tables are lagged

[8] ROA and FCFA are highly correlated, so we omitted ROA from the models that include FCFA or MONBEN variables.

significantly associated. Most of these variables retain their expected signs and statistical significance when included together in models 6 through 8.

Regarding the control variables, we find that the coefficients for firm size, firm age, and the number of business segments are positive and significant, consistent with prior literature. Fama and Jensen (1983) argue that a firm's organizational structure is shaped by the complexity and scale of its operations. Similarly, Boone, Casares Field, Karpoff, and Raheja (2007) suggest that firm size and age serve as proxies for complexity, requiring greater oversight by the board of directors. Furthermore, as firms diversify into new product lines, the need for board to monitor managerial performance increases, as noted by Coles, Daniel, and Naveen (2008), as well as Anderson, Bates, Bizjak, and Lemmon (2000).

Table 4 reveals that mandatory retirement policy is positively associated with several monitoring-enhancing control variables, such as the number of analysts, institutional ownership, and the independence ratio, which are consistent with prior literature. For example, Jensen and Meckling (1976) indicate that analysts' activities can help mitigate agency costs, while Shleifer and Vishny (1986) emphasize the role of institutional ownership in improving management oversight. Furthermore, Hermalin and Weisbach (2003) highlight the significance of independent directors in corporate monitoring.

Conversely, Table 4 shows a negative association of mandatory retirement policy with some monitoring-diminishing control variables, such as classified boards and the CEO-chairman duality indicator in some models. Bebchuk and Cohen (2005) suggest that classified boards can contribute to management entrenchment. Additionally, Jensen (1993) argues that combining the roles of CEO and chairman may weaken internal controls.

4.1.1 Influence of S&P 1500 inclusion on the adoption of the mandatory retirement policy

Figures 1 and 4 reveal a noticeable difference in the adoption of mandatory retirement policies between S&P 1500 firms and non-indexed firms. Chen, Noronha, and Singal (2004) find that inclusion in the S&P 500 increases a firm's analyst coverage and media visibility, enhancing investor scrutiny, improving access to capital markets, and boosting institutional ownership. Consistent with this, indexed firms are more likely to have their governance practices subject to closer examination, influenced significantly by this increased visibility. Consequently, governance changes upon joining the S&P 1500 may amplify the effects of monitoring and advising benefits on the decision to implement a mandatory retirement policy. Table 5 provides a systematic investigation of this issue.

We regress the mandatory retirement policy indicator on variables related to monitoring and advising benefits, interacting them with the S&P 1500 dummy variable in Columns (1) to (5). Additionally, we construct two new variables, MONBEN and ADVBEN. MONBEN represents the first principal component extracted from free cash flow, industry concentration, and firm debt, while ADVBEN is the first principal component extracted from R&D expenditure and asset intangibility. In Columns (6) and (7), we include the interaction terms between these two principal components and the S&P 1500 dummy. Consistent with Table 4, all models include year and industry fixed effects.

Table 5 shows that the interaction term coefficients between most monitoring benefits-related variables and the S&P 1500 indicator are positive and significant, while those for advising benefits-related variables are negative and significant. These findings suggest that indexed firms with higher monitoring benefits are more likely to impose a mandatory retirement policy, whereas those with higher advising benefits are less likely to do so. Thus, we conclude that inclusion in the

S&P 1500 increases a firm's sensitivity to monitoring and advising benefits when deciding to adopt a mandatory retirement policy.

4.1.2 Effects of the Sarbanes-Oxley (SOX) Act of 2002 on imposing the mandatory retirement policy

Following the corporate scandals of Enron and WorldCom, the Sarbanes-Oxley Act (SOX) was enacted in 2002 to strengthen corporate governance, including key provisions related to the board of directors. Linck, Netter, and Yang (2008) document SOX's substantial impact on board structure, noting that corporate boards became larger and more independent as a result. Figure 4 shows an increase in the fraction of firms adopting a mandatory retirement policy after SOX, which we interpret as a reflection of firms' increased focus on balancing monitoring and advising benefits in their governance decisions. This section presents results on SOX's impact on the adoption of mandatory retirement policies. Specifically, we add interactions between each monitoring- and advising-related variable, as well as MONBEN and ADVBEN, with a POSTSOX dummy variable (equal to 1 for years after 2001 and 0 otherwise) to the models in Table 6.

Table 6 shows that the interaction term between the monitoring benefits variable and the POSTSOX indicator is positive and significant in most models, while the interaction between the advising benefits variable and the POSTSOX indicator is negative and significant. These findings suggest that, in the post-SOX period, firms with higher monitoring benefits are more likely to impose a mandatory retirement policy, whereas firms with higher advising benefits are less likely to do so. We conclude that, post-SOX, firms have become more sensitive to monitoring and advising benefits when implementing mandatory retirement policies. This shift may be driven by improvements in governance practices introduced by SOX.

4.2. The usage of mandatory retirement policies over the firm life cycle

Table 7 presents the relationship between mandatory retirement policy and a firm's lifecycle stage. Prior literature suggests that firms require different roles from their board members at various stages of their lifecycle. For example, firms in earlier stages may benefit more from directors' advisory roles, while firms in the mature stage might place greater emphasis on directors' monitoring functions (Ewens and Malenko, 2020; Johnson, Karpoff, and Yi, 2022). Following prior studies on firm lifecycles, we construct five dummy variables for each life stage based on Dickinson (2011), as shown in Panel A of Table 7. We then, in Panel B of Table 7, regress the mandatory retirement policy indicator on each of the lifecycle dummies separately in Columns (1) through (5), controlling for related variables as in previous tables. In Column (6), we include all the dummies (except for the introduction stage), using the introduction stage as the baseline for comparing the other lifecycle coefficients.

Panel B of Table 7 shows the positive and significant association between the mature and shake-out stages and mandatory retirement policies, consistent with our expectation that firms in the mature and shake-out stages demand more monitoring from their directors. Conversely, the introduction, growth, and decline stages are negatively associated with mandatory retirement policies, suggesting that firms with higher advising needs are less likely to adopt such policies.

4.2.1 Additional evidence on the advising role on mandatory retirement policies (based on exogenous CEO's sudden death)

The sudden death of a CEO serves as an exogenous shock to a firm's advising needs, potentially shifting the board's focus toward advising and influencing the firm's inclination to implement a mandatory retirement policy. To explore this possibility, we utilize the dataset of in-office CEO deaths compiled by Gentry, Harrison, Quigley, and Boivie (2021), which includes 61 such events between 1994 and 2017. We exclude firms that had a mandatory retirement policy in place one year before the incident, as well as those lacking data for at least three years before and after the event, resulting in 17 CEO death incidents between 1994 and 2017.

To identify control firms, we employ propensity score matching techniques. First, we select a pool of control firms that did not experience a CEO change within three years before and after the date of the CEO's death in the treated firm. Next, we use a logit model to estimate propensity scores based on firm size, then match each treated firm to up to five (ten) nearest neighbors by these scores. We ensure that matched firms belong to the same Fama-French 12 industry classification, institutional ownership quintile, and board structure (e.g., presence of a classified board). The POST variable takes a value of zero for the three years prior to the incident and one for the three years following it, while the TREATMENT dummy is set to one for treated firms and zero for control firms. Finally, we include an interaction term between the POST and TREATMENT dummies, along with control variables, in a model with firm and year fixed effects to assess the impact of a sudden CEO death on the likelihood of imposing mandatory retirement policies.

We present the results of the difference-in-difference analysis in Table 8. In Column (1), we include the interaction between the POST and TREATMENT variables, along with firm and year fixed effects, where the fixed effects absorb the standalone POST and TREATMENT variables. In Column (2), we add the additional controls used in previous tables. The results in Panel A of Table 8 show that the interaction term coefficient between POST and TREATMENT is negative and significant, even after controlling for all related control variables. In Panel B of Table 8, we repeat the same matching procedure and match each treated firm to up to ten nearest neighbors and find a similar result. These findings suggest that firms are less likely to implement mandatory retirement policies within the three years following a CEO's sudden death. A plausible explanation for this reluctance is an increased need for advice from current directors, who have a deeper understanding of the firm in the wake of such an event.

4.3 Mandatory retirement policies and firm value

4.3.1 The average effect of mandatory retirement policies on firm value

After examining the determinants of mandatory retirement policies, we assess the policy's average impact on firm value, measured by Tobin’s Q, in Panel A of Table 9. We include the MONBEN and ADVBEN variables in the OLS models, with industry and year dummies in models (1) and (2) and firm and year dummies in models (3) and (4). The results indicate a negative association between mandatory retirement policies and firm value in the OLS models with industry and year fixed effects (models (1) and (2)). However, in model (3), where firm and year fixed effects are added, the association between mandatory retirement policies and firm value becomes positive and significant.

These findings suggest a nuanced relationship between mandatory retirement policies and firm value, with a negative association observed in cross-sectional analysis but a positive association emerging in time-series analysis. Specifically, the time-series results indicate that firms choosing to adopt mandatory retirement policies may start with an ex ante lower firm value. Supporting this, our determinants model shows that firms with strong advising needs and those in a growth stage—typically associated with higher firm value—are less likely to adopt such policies. In contrast, firms with strong monitoring needs and those in mature or shakeout stages—often linked to lower firm value—are more inclined to implement mandatory retirement policies. By including firm fixed effects, which effectively remove time-invariant components of Tobin’s Q, mandatory retirement policy, and control variables, we mitigate potential bias from omitted firm-level variables. This approach enables a clearer comparison of the average firm value before and after the adoption of mandatory retirement policies, uncovering their positive impact on firm value over time.

In conclusion, the contrasting results between cross-sectional and time-series analyses highlight the nuanced impact of mandatory retirement policies on firm value. Cross-sectional findings suggest that, broadly, mandatory retirement policies may be associated with a reduction in firm value. However, when considering firm-level changes over time, these policies appear to enhance firm value, potentially due to improved board dynamics and governance alignment. This time-series association underscores the importance of examining both cross-sectional and temporal effects to fully understand the influence of board policies on firm value.

4.3.2. Instrumental variable (IV)

To further bolster the credibility of our findings, we use an instrumental variable (IV) approach to complement the firm fixed effects approach in addressing potential endogeneity in the relationship between mandatory retirement policies and firm value. The IV, based on geographic proximity as proposed by Karpoff, Schonlau, and Wehrly (2017), leverages the external influence of neighboring firms' board policies to introduce exogenous variation. Specifically, the IV captures the mandatory retirement policies of geographically proximate firms—excluding those in the same industry—five years prior, under the premise that firms in the same region are influenced by shared networks, legal advisors, and localized practices (Coates, 2001). This instrument helps disentangle the causal effect of mandatory retirement policies by focusing on policy adoption driven by regional factors unrelated to the firm's intrinsic characteristics or contemporaneous performance.

To construct the IV, we start by identifying all firms located within a 100-mile radius of the focus firm's headquarters, utilizing Compustat's headquarters zip code data and SAS's 2014 longitude and latitude coordinates for these zip codes. From this pool, we exclude firms that either belong to the same Fama-French 49 industry classification as the focus firm or are situated in a different state. If this method yields fewer than three peer firms, we expand our criteria to include firms from the entire state rather than limiting the selection to those within a 100-mile radius.

Panel B of Table 9, Columns (1) and (3), presents the first-stage results of our geography-based IV analysis within the fixed-effects models (models 3 and 4 of Panel A of Table 9), while the second-stage results are shown in Columns (2) and (4). In Columns (1) and (3), we observe a positive and significant correlation between the instrument and the respective endogenous variable, satisfying the relevance condition for valid instruments. We use the Angrist-Pischke (2009) F-statistic (APF) to assess weak identification. Across Columns (1) and (3), the APF exceeds 19, indicating that the instruments sufficiently identify the models and address potential endogeneity concerns. In Columns (2) and (4) of Panel B, we present the second-stage coefficients of the IV estimation with firm fixed effects, which isolate the effect of geography-induced mandatory retirement policies on firm value. These IV results confirm a positive association between mandatory retirement policies and firm value.

4.3.3 The impact of the mandatory retirement policy on firm value (Tobin's Q) based on the levels of monitoring and advising benefits

To explore the impact of mandatory retirement policies on firm value based on monitoring and advising benefit levels, we repeat the analysis of Table 9 by adding the interaction of the MONBEN and ADVBEN and the mandatory retirement policies to the models. Based on our hypothesis, we expect that if firms with high monitoring (advising) benefits implement mandatory retirement policies, it will benefit (hurt) the firm in the form of firm value.

Columns 1 and 3 of Table 10 display the impact of the mandatory retirement policy on the firm's value with different monitoring and advising benefits levels, using the firm and year dummies. Column (1) of Table 10 shows that the coefficient of the interaction term of monitoring benefits and the mandatory retirement policy is positive and significant, showing that developing the mandatory retirement policy increases firm value in firms with high monitoring benefits. Column (3) of Table 10 shows the coefficient of the interaction term of advising benefits and mandatory retirement policy is negative, albeit insignificant. We re-estimate the OLS results in Columns (1) and (3) using the same geography-based instrumental variable, and results are reported in Columns (2) and (4). We find qualitatively and even stronger results than the OLS regressions.

5 Conclusion

This paper explores the consequences and determinacies of imposing the mandatory retirement policy for independent directors for the first time. We use novel machine-learning techniques combined with manual inspections to investigate the mandatory retirement policies in all available SEC EDGAR data between 1994 and 2020.

Results show that when monitoring (advising) managers is highly beneficial for the firm, it is more (less) likely that the firms develop mandatory retirement policies. In this vein, imposing the mandatory retirement policies benefits (harms) firm value on the firms that monitoring (advising) of managers is favorable for them. Furthermore, firms tend to impose the mandatory retirement policy when they are in mature or shake-out stages in which they are in stable conditions and take less risk. The relation between mandatory retirement policies and firm value is consistently confirmed by robustness checks conducted through instrumental variable (IV) analysis. It boosts confidence in the study's conclusions and establishes a solid framework to investigate causal effects.

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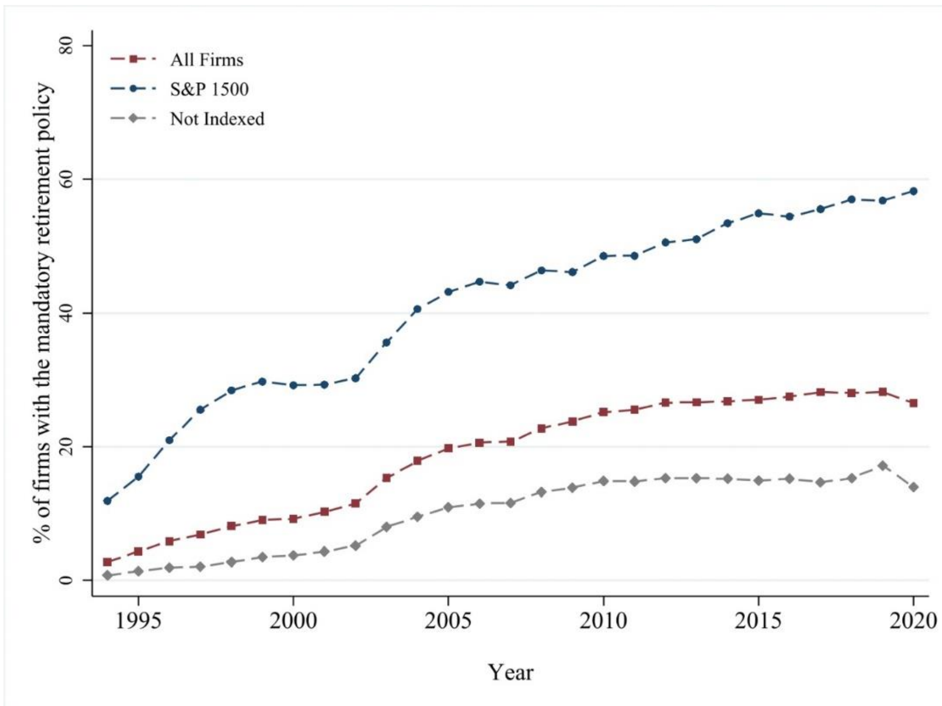
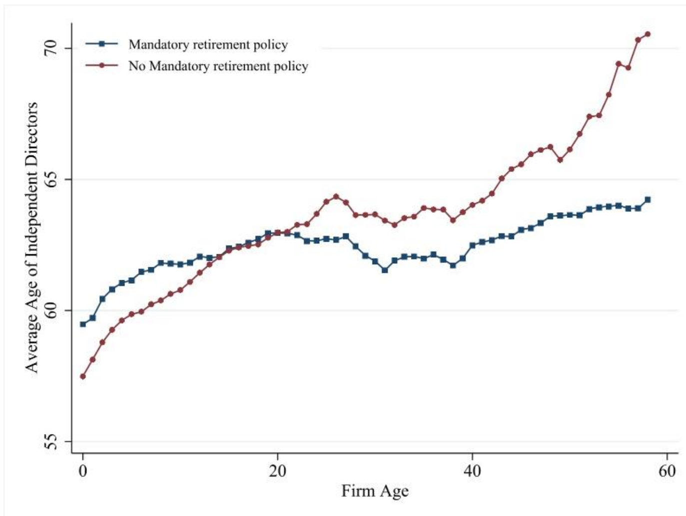


Figure 1. Effects of S&P indexing on implementing mandatory retirement policy for independent directors. This figure illustrates the percentage of firms implementing the mandatory retirement policy for independent directors between 1994 and 2020 across full sample, S&P 1500 firms and non-SP 1500 firms.

Panel A: Average age of independent directors



Panel B: Average tenure of independent directors

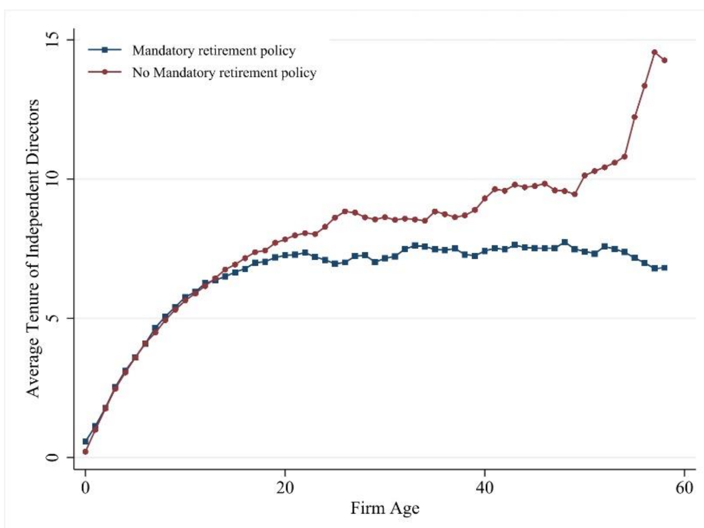


Figure 2. Impact of mandatory retirement policy for independent directors on independent directors' tenure and age. This figure shows the average age (Figure A) and tenure (Figure B) of independent directors in firms that implemented the mandatory retirement policy between 1994 and 2020 and in firms that did not implement that policy based on the firm age.

Figure 3. Distribution of firms that impose mandatory retirement policy for independent directors across Fama-French 12 industry classifications. This figure demonstrates the distribution of the mandatory retirement policy within the 12 Fama-French industry portfolios between 1994 and 2020. Groups 11 and 9, which correspond to financial and utility firms, are not shown in this figure because we omit financials (SIC 6000-6999) and utilities (SIC 4900-4949) from our dataset.

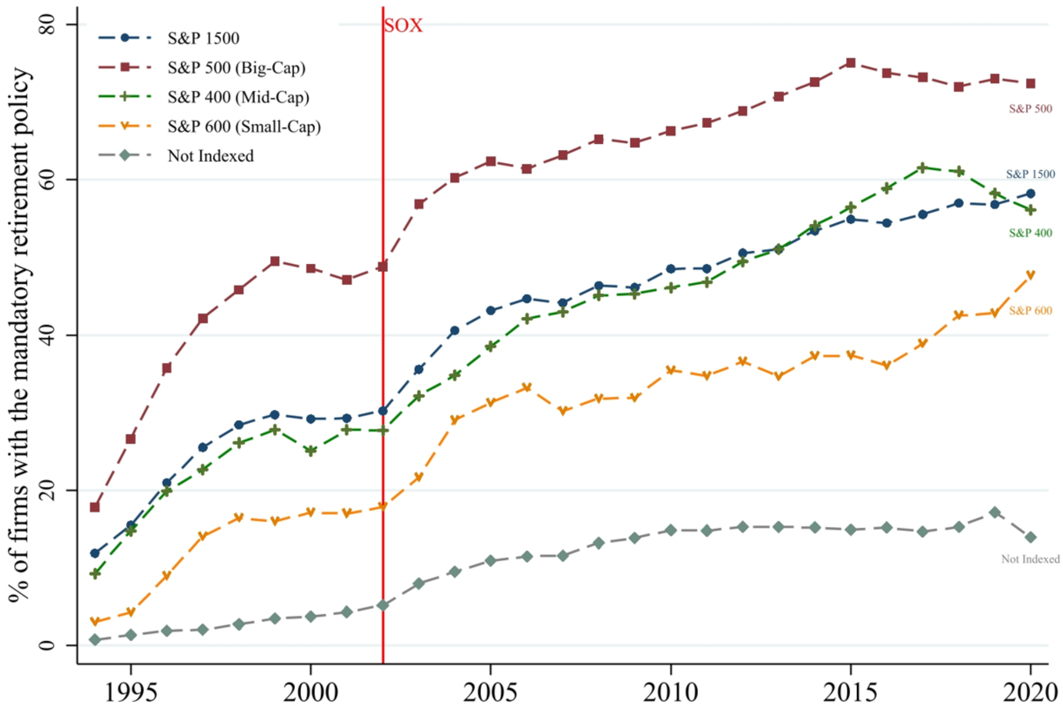


Figure 4. Effects of S&P indexing and the Sarbanes-Oxley Act on implementing mandatory retirement policy for independent directors. This figure illustrates the percentage of firms implementing the mandatory retirement policy for independent directors between 1994 and 2020 across various S&P indices like S&P 1500, S&P 500, S&P 400, S&P 600, and companies that are not indexed. Additionally, it marks the enactment of the SOX in 2002.

Table 1

Sample Construction

This table presents the construction of the sample, which includes sample filters and the number of observations under each filter.

Sample filter	# of observations
Initial CRPS-Compustat merged sample between 1994 and 2022	174,131
Exclude financials	(47,676)
Exclude utilities	(3,868)
Exclude Missing data in the dataset.	(54,976)
	67,611

Table 2
Sample Distribution

This table displays the sample distribution. Panel A details the annual allocation of companies that implemented the mandatory retirement policy for independent directors from 1994 to 2020, showing the percentage of these firms relative to the entire CRSP-Compustat merged sample and the (Non-) S&P 1500 firms. Panel B provides the number and percentage of companies implementing the mandatory retirement policy within the 12 Fama-French industry classifications. We omit financials (SIC 6000-6999) and utilities (SIC 4900-4949) from our dataset.

Panel A. Annual distribution of firms with the mandatory retirement policy in and outside of S&P 1500 firms and the entire CRSP-Compustat merged sample

Year	Mandatory retirement policy	Mandatory retirement policy (S&P 1500)	% of CRSP-Compustat	% of S&P 1500 firms	% of Non-S&P 1500 firms
1994	149	115	2.8%	11.9%	0.8%
1995	246	184	4.4%	15.5%	1.4%
1996	362	269	5.9%	21.0%	1.9%
1997	430	328	6.9%	25.5%	2.0%
1998	480	352	8.1%	28.4%	2.7%
1999	512	356	9.0%	29.7%	3.5%
2000	512	350	9.2%	29.2%	3.7%
2001	512	347	10.2%	29.3%	4.3%
2002	535	354	11.5%	30.2%	5.2%
2003	667	412	15.3%	35.6%	8.0%
2004	772	472	17.9%	40.6%	9.5%
2005	833	498	19.8%	43.2%	10.9%
2006	858	512	20.6%	44.7%	11.5%
2007	844	505	20.8%	44.1%	11.6%
2008	871	510	22.7%	46.4%	13.2%
2009	864	516	23.8%	46.1%	13.9%
2010	893	527	25.2%	48.5%	14.9%
2011	889	537	25.5%	48.6%	14.8%
2012	914	556	26.6%	50.5%	15.3%
2013	929	566	26.7%	51.0%	15.3%
2014	966	583	26.8%	53.4%	15.2%
2015	964	593	27.0%	54.9%	14.9%
2016	953	591	27.5%	54.4%	15.2%
2017	980	638	28.2%	55.5%	14.7%
2018	990	615	28.0%	57.0%	15.3%
2019	1005	563	28.2%	56.8%	17.2%
2020	993	619	26.5%	58.2%	14.0%
Total	19,923	12,468	18.7%	41.1%	10.0%

Panel B. Annual distribution of firms with mandatory retirement policy for independent directors within the Fama-French 12 industry classification.

Code	Name	Mandatory retirement policy	CRSP-Compustat	%
1	Non-Durables	1,623	7,323	22.2%
2	Durables	938	3,581	26.2%
3	Manufacturing	3,973	14,200	28.0%
4	Energy	1,448	6,165	23.5%
5	Chemicals	1,074	3,183	33.7%
6	Business Equipment	3,049	27,725	11.0%
7	Telecommunication	737	4,686	15.7%
9	Shops	2,335	13,643	17.1%
10	Healthcare	1,765	17,263	10.2%
12	Other	2,981	19,992	14.9%
Total		19,923	117,761	20.3%

Table 3
Descriptive statistics

This table shows summary statistics of the firm and board of directors' variables. The sample comprises 13,386 firms covering 117,761 firm-year observations from 1994 to 2020. This table presents the values of the variables' mean, median, standard deviation, 25th percentile, and 75th percentile. Continuous variables are winsorized at their 1st and 99th percentiles. The definitions of the variables are provided in Appendix A. We omit financials (SIC 6000-6999) and utilities (SIC 4900-4949) from our dataset.

Variable	N	Mean	SD	p25	Median	p75
Firm Characteristics						
Tobin's Q	117,068	2.209	1.910	1.132	1.561	2.470
FCFA	116,159	-0.051	0.265	-0.070	0.035	0.082
Debt	117,158	0.180	0.204	0.001	0.116	0.293
HHI	117,761	0.079	0.082	0.038	0.050	0.089
Asset Intangibility	117,425	0.734	0.242	0.606	0.818	0.925
R&D	117,546	0.063	0.128	0.000	0.002	0.070
Market Value of Equity ($ Millions)	117,182	4392.386	23340.233	61.940	303.687	1500.165
Firm Age	117,761	12.676	12.353	3.000	9.000	19.000
Num. of Bus. Segments	117,761	4.680	4.467	1.000	3.000	6.000
ROA	117,380	-0.075	0.307	-0.080	0.023	0.069
Num. of Analysts	117,761	5.286	6.453	1.000	3.000	7.250
IO	117,761	0.382	0.341	0.026	0.319	0.697
Board Characteristics						
Mandatory retirement policy	117,761	0.169	0.375	0.000	0.000	0.000
Independence Ratio	88,671	0.674	0.163	0.600	0.714	0.800
Board Size	88,673	7.939	2.554	6.000	8.000	9.000
CEO_Chairman	87,879	0.475	0.499	0.000	0.000	1.000
CEO_Retirement	84,067	0.223	0.416	0.000	0.000	0.000
Classified Board	94,137	0.460	0.498	0.000	0.000	1.000

Table 4
Determinants of the mandatory retirement policy for independent directors

The data in the table displays the outcomes of OLS regressions (model 8 is a probit model) that examine the connection between mandatory retirement policy for independent directors and firm characteristics related to the monitoring and advising benefits from 1994 to 2020. The dependent variable mandatory retirement policy is one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. Variables associated with monitoring benefits are free cash flow, debt, and industry concentration. Characteristics of firms related to advising benefits include R&D expenditure and asset intangibility. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Mandatory retirement policy							
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FCFA	0.126***					0.063***	-0.029**	0.257**
	(10.88)					(4.50)	(-2.16)	(2.09)
Debt		0.064***				0.030	0.064***	0.330***
		(3.27)				(1.50)	(3.35)	(3.69)
HHI			0.285***			0.286***	0.218***	0.754***
			(4.27)			(4.25)	(3.30)	(2.72)
Asset Intangibility				-0.108***		-0.087***	-0.057**	-0.369***
				(-4.29)		(-3.35)	(-2.31)	(-3.09)
R&D					-0.286***	-0.194***	-0.123***	-0.714**
					(-8.74)	(-5.74)	(-3.83)	(-2.56)
Firm Size							0.029***	0.133***
							(9.39)	(8.16)
Firm Age							0.008***	0.029***
							(19.83)	(17.29)
Num. of Bus. segments							0.004***	0.011**
							(3.78)	(2.52)
ROA		0.085***	0.082***	0.079***	0.009			
		(9.19)	(8.96)	(8.62)	(0.84)			
Num. of Analysts	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.001	-0.005
	(6.12)	(6.21)	(6.15)	(6.10)	(6.59)	(6.45)	(0.99)	(-1.28)
IO	0.109***	0.111***	0.115***	0.116***	0.115***	0.107***	0.047***	0.344***
	(6.70)	(6.81)	(7.06)	(7.08)	(7.07)	(6.57)	(2.76)	(4.53)
Independence Ratio	0.348***	0.347***	0.345***	0.346***	0.355***	0.355***	0.286***	1.612***
	(15.83)	(15.90)	(15.85)	(15.91)	(16.26)	(16.17)	(13.54)	(12.26)
Board Size	0.044***	0.044***	0.044***	0.044***	0.043***	0.043***	0.023***	0.104***
	(21.72)	(21.46)	(21.98)	(21.74)	(21.56)	(21.09)	(11.60)	(11.59)
CEO_Chairman	0.012*	0.011	0.012*	0.011*	0.008	0.009	-0.004	-0.075**
	(1.71)	(1.60)	(1.72)	(1.65)	(1.23)	(1.25)	(-0.58)	(-2.26)
CEO_Retirement	-0.004	-0.002	-0.002	-0.004	-0.003	-0.006	-0.032***	-0.095***
	(-0.51)	(-0.33)	(-0.32)	(-0.49)	(-0.47)	(-0.74)	(-4.36)	(-2.96)
Classified Board	-0.022***	-0.022***	-0.022***	-0.023***	-0.021**	-0.021**	0.005	0.093**
	(-2.63)	(-2.67)	(-2.61)	(-2.78)	(-2.53)	(-2.57)	(0.66)	(2.40)
Constant	-0.615***	-0.629***	-0.723***	-0.559***	-0.608***	-0.665***	-0.708***	-5.560***
	(-10.17)	(-11.09)	(-11.41)	(-9.33)	(-10.70)	(-9.94)	(-10.82)	(-13.19)
Fixed effects	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind, year
R^2 /Pseudo R^2	0.266	0.266	0.265	0.266	0.267	0.271	0.333	0.341
Observations	67,903	68,117	68,348	68,285	68,348	67,631	67,611	67,471

Table 5
Determinants of the mandatory retirement policy for independent directors — S&P-indexed firms

The table presents the results of OLS regressions investigating the relation between mandatory retirement policy for independent directors and firm characteristics related to the monitoring and advising benefits for S&P 1500 firms from 1994 to 2020. The dependent variable, the mandatory retirement policy, is one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. SP1500 variable is one if the firm is indexed in one of the S&P indices. MONBEN (Monitoring Benefits) is the factor extracted from free cash flow, industry concentration, and the firm's debt. ADVBEN (Advising Benefits) is the factor extracted from R&D expenditure and asset intangibility. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Mandatory retirement policy						
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SP1500	0.087***	0.053***	0.084***	0.178***	0.115***	0.082***	0.087***
	(7.38)	(3.89)	(5.97)	(5.39)	(8.88)	(7.01)	(7.55)
FCFA	0.004						
	(0.42)						
FCFA × SP1500	0.154***						
	(2.59)						
Debt		0.030					
		(1.62)					
Debt × SP1500		0.234***					
		(5.50)					
HHI			0.172**				
			(2.37)				
HHI × SP1500			0.132				
			(1.24)				
Asset Intangibility				-0.045*			
				(-1.94)			
Asset Intangibility × SP1500				-0.114***			
				(-2.78)			
R&D					-0.139***		
					(-4.80)		
R&D × SP1500					-0.627***		
					(-5.19)		
MONBEN						0.012***	
						(3.10)	
MONBEN × SP1500						0.057***	
						(5.90)	
ADVBEN							-0.020***
							(-4.32)
ADVBEN × SP1500							-0.046***
							(-4.20)
Firm Size	0.023***	0.025***	0.024***	0.025***	0.025***	0.023***	0.026***
	(7.34)	(7.94)	(7.68)	(8.11)	(7.97)	(7.36)	(8.35)
Firm Age	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(17.31)	(17.56)	(17.51)	(17.43)	(17.30)	(17.38)	(17.27)
Num. of Bus. segments	0.004***	0.004***	0.004***	0.005***	0.004***	0.004***	0.004***
	(3.81)	(3.75)	(3.95)	(4.02)	(3.58)	(3.73)	(3.80)
ROA		-0.012	-0.016*	-0.017**	-0.052***		-0.045***
		(-1.39)	(-1.84)	(-2.02)	(-5.47)		(-4.62)

Num. of Analysts	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(-0.02)	(-0.22)	(-0.12)	(-0.48)	(0.19)	(-0.07)	(-0.39)
IO	0.015	0.015	0.017	0.018	0.017	0.011	0.018
	(0.86)	(0.86)	(1.02)	(1.07)	(1.00)	(0.65)	(1.07)
Independence Ratio	0.267***	0.261***	0.265***	0.266***	0.271***	0.262***	0.271***
	(12.91)	(12.74)	(12.90)	(13.00)	(13.23)	(12.70)	(13.20)
Board Size	0.024***	0.022***	0.024***	0.023***	0.022***	0.023***	0.022***
	(11.99)	(11.17)	(11.93)	(11.68)	(11.24)	(11.55)	(11.29)
CEO_Chairman	-0.002	-0.003	-0.002	-0.003	-0.005	-0.002	-0.004
	(-0.27)	(-0.40)	(-0.27)	(-0.40)	(-0.72)	(-0.30)	(-0.68)
CEO_Retirement	-0.032***	-0.030***	-0.031***	-0.032***	-0.031***	-0.032***	-0.032***
	(-4.39)	(-4.14)	(-4.23)	(-4.34)	(-4.32)	(-4.36)	(-4.40)
Classified Board	0.006	0.006	0.006	0.004	0.005	0.006	0.003
	(0.71)	(0.79)	(0.72)	(0.47)	(0.58)	(0.79)	(0.41)
Constant	-0.610***	-0.601***	-0.675***	-0.590***	-0.591***	-0.638***	-0.622***
	(-10.33)	(-10.97)	(-10.88)	(-10.10)	(-10.72)	(-10.35)	(-10.91)
Fixed effects	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year
R^2	0.336	0.340	0.336	0.337	0.339	0.340	0.339
Observations	67,883	68,096	68,327	68,264	68,327	67,652	68,264

Table 6
Determinants of the mandatory retirement policy for independent directors –pre- and post-SOX

The table presents the results of OLS regressions investigating the impact of the enactment of the Sarbanes-Oxley Act (SOX) on relation between mandatory retirement policy for independent directors and firm characteristics related to the monitoring and advising benefits from 1994 to 2020. The dependent variable mandatory retirement policy is one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. POSTSOX variable equals one if the sample year is after 2001. MONBEN (Monitoring Benefits) is the factor extracted from free cash flow, industry concentration, and the firm's debt. ADVBEN (Advising Benefits) is the factor extracted from R&D expenditure and asset intangibility. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Mandatory retirement policy						
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FCFA	-0.065***						
	(-6.62)						
FCFA × POSTSOX	0.112***						
	(7.99)						
Debt		-0.008					
		(-0.41)					
Debt × POSTSOX		0.122***					
		(4.85)					
HHI			0.133*				
			(1.68)				
HHI × POSTSOX			0.097				
			(1.22)				
Asset Intangibility				-0.019			
				(-0.79)			
Asset Intangibility × POSTSOX				-0.097***			
				(-3.93)			
R&D					-0.080***		
					(-2.69)		
R&D × POSTSOX					-0.171***		
					(-5.64)		
MONBEN						-0.005	
						(-1.27)	
MONBEN × POSTSOX						0.033***	
						(7.25)	
ADVBEN							-0.012**
							(-2.43)
ADVBEN × POSTSOX							-0.025***
							(-5.54)
Firm Size	0.028***	0.029***	0.029***	0.030***	0.030***	0.027***	0.030***
	(8.91)	(9.21)	(9.25)	(9.34)	(9.40)	(8.54)	(9.44)
Firm Age	0.008***	0.009***	0.009***	0.009***	0.008***	0.008***	0.008***
	(19.82)	(20.41)	(20.09)	(20.06)	(19.90)	(19.89)	(19.86)
Num. of Bus. segments	0.005***	0.005***	0.005***	0.005***	0.004***	0.004***	0.004***
	(4.03)	(4.08)	(4.23)	(4.19)	(3.80)	(3.89)	(3.83)
ROA		-0.015*	-0.018**	-0.021**	-0.070***		-0.064***
		(-1.76)	(-2.06)	(-2.46)	(-6.90)		(-6.23)
Num. of Analysts	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(1.03)	(0.92)	(0.87)	(0.78)	(1.06)	(1.22)	(0.94)
IO	0.051***	0.052***	0.056***	0.057***	0.055***	0.045***	0.055***

	(2.99)	(3.04)	(3.29)	(3.33)	(3.21)	(2.66)	(3.24)
Independence Ratio	0.277***	0.278***	0.277***	0.279***	0.282***	0.279***	0.283***
	(13.17)	(13.33)	(13.27)	(13.40)	(13.45)	(13.23)	(13.53)
Board Size	0.025***	0.023***	0.024***	0.024***	0.024***	0.024***	0.024***
	(12.42)	(11.71)	(12.24)	(12.10)	(11.96)	(12.19)	(11.88)
CEO_Chairman	-0.001	-0.002	-0.001	-0.002	-0.003	-0.001	-0.004
	(-0.15)	(-0.32)	(-0.21)	(-0.31)	(-0.53)	(-0.22)	(-0.56)
CEO_Retirement	-0.031***	-0.030***	-0.030***	-0.031***	-0.031***	-0.032***	-0.032***
	(-4.29)	(-4.12)	(-4.13)	(-4.27)	(-4.21)	(-4.38)	(-4.32)
Classified Board	0.006	0.006	0.006	0.005	0.007	0.007	0.006
	(0.78)	(0.77)	(0.73)	(0.64)	(0.87)	(0.89)	(0.79)
Constant	-0.653***	-0.646***	-0.720***	-0.657***	-0.649***	-0.680***	-0.670***
	(-11.15)	(-11.76)	(-11.47)	(-10.97)	(-11.64)	(-11.01)	(-11.44)
Fixed effects	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year
R^2	0.331	0.332	0.330	0.332	0.332	0.333	0.333
Observations	67,883	68,096	68,327	68,264	68,327	67,652	68,264

Table 7
Firm life cycle

Panel A displays firm-specific life cycle measure by using data from a company's cash flow statement constructed by Dickinson (2011). She posits that cash flows capture a firm's profitability, growth, and risk variations. Consequently, cash flows from operating activities (OANCF), investing activities (IVNCF), and financing activities (FINCF) can be utilized to classify firms into various life cycle stages, such as introduction, growth, maturity, decline, and shake-out. Detailed descriptions of these life cycle stages are provided in Panel A. The data presented in Panel B displays the outcomes of OLS regressions that examine the connection between the Mandatory retirement policy for independent directors and the corporate life cycle from 1994 to 2020. The dependent variable, mandatory retirement policy, is set to one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise —life cycle stages constructed by Dickinson (2011). In model 6, we use the introduction stage as the baseline, so other life cycle coefficients are compared to the introduction life cycle. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Different life stages by Dickinson (2011)

	Cash Flow from:		
Firm stages	Operating (OANCF)	Investing (IVNCF)	Financing (FINCF)
Introduction	< 0	< 0	> 0
Growth	> 0	< 0	> 0
Maturity	> 0	< 0	< 0
Shake-Out	All Other combinations		
Decline	< 0	> 0	< 0 Or > 0

Panel B. Mandatory retirement policy for independent directors and firm life cycle

	Dependent variable: Mandatory retirement policy					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Introduction (Life Cycle)	-0.017***					
	(-3.84)					
Growth (Life Cycle)		-0.024***				0.003
		(-5.48)				(0.54)
Mature (Life Cycle)			0.029***			0.037***
			(6.35)			(5.72)
Shake_Out (Life Cycle)				0.013**		0.031***
				(2.14)		(4.32)
Decline (Life cycle)					-0.011*	0.002
					(-1.67)	(0.27)
Firm Size	0.029***	0.030***	0.029***	0.030***	0.029***	0.029***
	(9.34)	(9.44)	(9.27)	(9.37)	(9.27)	(9.33)
Firm Age	0.009***	0.008***	0.008***	0.009***	0.009***	0.008***
	(19.97)	(19.87)	(19.67)	(20.11)	(20.16)	(19.45)
Num. of Bus. segments	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(4.19)	(4.25)	(4.18)	(4.22)	(4.22)	(4.15)
ROA	-0.024***	-0.012	-0.029***	-0.018**	-0.020**	-0.033***
	(-3.02)	(-1.34)	(-3.46)	(-2.12)	(-2.41)	(-4.17)
Num. of Analysts	0.001	0.001	0.001	0.001	0.001	0.001
	(0.79)	(0.80)	(0.81)	(0.83)	(0.85)	(0.77)
IO	0.054***	0.059***	0.055***	0.056***	0.056***	0.055***
	(3.16)	(3.46)	(3.25)	(3.29)	(3.29)	(3.20)
Independence Ratio	0.277***	0.276***	0.277***	0.277***	0.278***	0.277***
	(13.28)	(13.23)	(13.30)	(13.28)	(13.31)	(13.27)
Board Size	0.024***	0.024***	0.024***	0.024***	0.024***	0.024***
	(12.18)	(12.08)	(12.03)	(12.19)	(12.20)	(11.97)
CEO_Chairman	-0.001	-0.001	-0.002	-0.001	-0.002	-0.002
	(-0.21)	(-0.20)	(-0.27)	(-0.21)	(-0.24)	(-0.25)
CEO_Retirement	-0.031***	-0.030***	-0.031***	-0.030***	-0.030***	-0.031***
	(-4.17)	(-4.13)	(-4.20)	(-4.13)	(-4.14)	(-4.21)
Classified Board	0.005	0.006	0.006	0.006	0.005	0.006
	(0.67)	(0.73)	(0.71)	(0.69)	(0.67)	(0.74)
Constant	-0.650***	-0.644***	-0.656***	-0.656***	-0.653***	-0.662***
	(-11.61)	(-11.57)	(-11.64)	(-11.77)	(-11.67)	(-11.80)
Fixed effects	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year	Ind., year
R^2	0.330	0.330	0.331	0.330	0.330	0.331
Observations	68,327	68,327	68,327	68,327	68,327	68,327

Table 8
Difference-in-Difference Analysis

This table shows the difference-in-difference analysis for showing the effects of the CEO's sudden death on the tendency of firms to implement mandatory retirement policies for independent directors. Mandatory retirement policy (dependent variable) is set to one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. The TREATMENT variable is a binary indicator set to one for firms that experienced a sudden death event and zero for the control firms. The POST variable is also a binary indicator, set to one for the three years following the event and zero for the three years preceding it. MONBEN (Monitoring Benefits) is the factor extracted from free cash flow, industry concentration, and the firm's debt. ADVBEN (Advising Benefits) is the factor extracted from R&D expenditure and asset intangibility. In Panel A, we match up to 5 control firms for each treatment firm. In Panel B, we match up to 10 control firms for each treatment firm. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: 1 to 5 matching

	Dependent variable: Mandatory retirement policy	
Independent variables	(1)	(2)
TREATMENT × POST	-0.122**	-0.122**
	(-2.60)	(-2.37)
MONBEN		-0.004
		(-0.10)
ADVBEN		-0.041
		(-0.53)
Firm Size		-0.037
		(-1.16)
Firm Age		-0.009
		(-1.19)
Num. of Bus. segments		0.003
		(0.53)
ROA		0.039
		(0.18)
Num. of Analysts		-0.001
		(-0.33)
IO		0.208
		(1.15)
Independence Ratio		0.046
		(0.38)
Board Size		-0.029**
		(-2.00)
CEO_Chairman		0.022
		(0.45)
CEO_Retirement		0.008
		(0.20)
Classified Board		-0.178
		(-0.86)
Constant	-0.386**	0.196
	(-2.16)	(0.71)
Fixed effects	Firm, year	Firm, year
R^2	0.156	0.216
Observations	367	367

Panel B: 1 to 10 matching

	Dependent variable: Mandatory retirement policy	
Independent variables	(1)	(2)
TREATMENT × POST	-0.158***	-0.178***
	(-2.86)	(-3.11)
MONBEN		0.035
		(0.76)
ADVBEN		0.051
		(0.52)
Firm Size		-0.061*
		(-1.89)
Firm Age		-0.002
		(-0.23)
Num. of Bus. segments		0.005
		(0.91)
ROA		0.315
		(1.37)
Num. of Analysts		-0.001
		(-0.29)
IO		0.282
		(1.40)
Independence Ratio		0.004
		(0.03)
Board Size		-0.026**
		(-2.27)
CEO_Chairman		0.015
		(0.42)
CEO_Retirement		-0.013
		(-0.38)
Classified Board		-0.238
		(-1.14)
Constant	-0.478**	0.168
	(-2.51)	(0.59)
Fixed effects	Firm, year	Firm, year
R^2	0.212	0.278
Observations	506	506

Table 9
Mandatory retirement policy for independent directors and firm value (average impact)

Panel A of the table presents the results of OLS estimations investigating the relation between firm value (Tobin's Q) and mandatory retirement policy for independent directors by controlling for various firm characteristics from 1994 to 2020. Panels B display the first-stage and second-stage results of the 2SLS estimations. The dependent variable, Tobin's Q, is defined as the ratio of the book value of assets plus the market value of common equity minus the book value of common equity to the book value of assets. The mandatory retirement policy is set to one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. MONBEN (Monitoring Benefits) is the factor extracted from free cash flow, industry concentration, and the firm's debt. ADVBEN (Advising Benefits) is the factor extracted from R&D expenditure and asset intangibility. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. OLS results

	Dependent variable: Tobin's Q			
Independent variables	(1)	(2)	(3)	(4)
Mandatory retirement policy	-0.200***	-0.201***	0.072*	0.062
	(-5.83)	(-6.20)	(1.87)	(1.64)
MONBEN	-0.429***		-0.127***	
	(-18.54)		(-6.51)	
ADVBEN		0.475***		0.401***
		(23.53)		(12.39)
Firm Size	0.402***	0.424***	0.332***	0.369***
	(31.10)	(32.71)	(21.30)	(22.74)
Firm Age	-0.011***	-0.006***	-0.006	-0.004
	(-8.89)	(-5.43)	(-1.34)	(-1.04)
Num. of Bus. segments	-0.038***	-0.033***	-0.013***	-0.016***
	(-12.83)	(-11.66)	(-4.66)	(-5.50)
ROA		-0.885***		-0.340***
		(-10.41)		(-5.17)
Num. of Analysts	-0.016***	-0.021***	-0.039***	-0.039***
	(-5.39)	(-6.82)	(-9.61)	(-9.66)
IO	-0.705***	-0.672***	-0.560***	-0.520***
	(-12.42)	(-12.79)	(-9.17)	(-8.69)
Independence Ratio	0.057	-0.080	-0.057	-0.063
	(0.72)	(-1.07)	(-0.79)	(-0.91)
Board Size	-0.095***	-0.102***	-0.057***	-0.059***
	(-14.03)	(-15.60)	(-9.55)	(-10.17)
CEO_Chairman	-0.051**	-0.028	-0.010	-0.012
	(-2.16)	(-1.21)	(-0.45)	(-0.54)
CEO_Retirement	-0.047*	-0.002	0.042**	0.043**
	(-1.86)	(-0.10)	(2.05)	(2.18)
Classified Board	-0.056**	-0.044*	-0.045	-0.051
	(-2.05)	(-1.71)	(-1.00)	(-1.14)
Constant	1.865***	1.284***	1.798***	1.615***
	(9.26)	(6.01)	(15.07)	(13.38)
Fixed effects	Ind., year	Ind., year	Firm, year	Firm, year
R^2	0.241	0.284	0.083	0.101
Observations	67,534	68,145	67,534	68,145

Panel B. Instrumental Variable approach

	(1)	(2)	(3)	(4)
	1st Stage	2nd Stage	1st Stage	2nd Stage
Independent variables	Mandatory retirement policy	Tobin's Q	Mandatory retirement policy	Tobin's Q
Mandatory retirement policy		1.589**		1.478**
		(2.12)		(2.01)
Instrument	0.382***		0.378***	
	(4.46)		(4.44)	
MONBEN	0.003	-0.124***		
	(0.76)	(-5.43)		
ADVBEN			0.003	0.412***
			(0.73)	(11.45)
Firm Size	0.006**	0.328***	0.007**	0.366***
	(2.18)	(17.07)	(2.52)	(18.05)
Firm Age	0.002	-0.009	0.002	-0.007
	(1.54)	(-1.50)	(1.57)	(-1.22)
Num. of Bus. segments	0.001	-0.014***	0.001	-0.016***
	(0.89)	(-3.80)	(0.79)	(-4.40)
ROA			-0.015*	-0.317***
			(-1.92)	(-4.20)
Num. of Analysts	-0.001	-0.040***	-0.001	-0.041***
	(-0.96)	(-8.58)	(-1.09)	(-8.63)
IO	0.007	-0.564***	0.007	-0.514***
	(0.51)	(-7.73)	(0.51)	(-7.23)
Independence Ratio	0.068***	-0.126	0.070***	-0.132
	(3.87)	(-1.27)	(4.00)	(-1.37)
Board Size	-0.003*	-0.049***	-0.003*	-0.051***
	(-1.78)	(-6.43)	(-1.90)	(-6.97)
CEO_Chairman	-0.007	-0.004	-0.008	-0.005
	(-1.30)	(-0.14)	(-1.33)	(-0.19)
CEO_Retirement	-0.014**	0.093***	-0.014**	0.092***
	(-2.36)	(3.44)	(-2.41)	(3.45)
Classified Board	-0.073***	0.017	-0.074***	0.002
	(-4.78)	(0.20)	(-4.87)	(0.02)
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year
R^2		0.024		0.051
Observations	52,394	52,394	52,859	52,859
APF	19.88		19.68	

Table 10

Mandatory retirement policy for independent directors and firm value

This table presents the results of OLS and 2SLS estimations investigating the relation between firm value (Tobin's Q) and mandatory retirement policy for independent directors based on the level of monitoring and advising needs from 1994 to 2020. The dependent variable, Tobin's Q, is defined as the ratio of the book value of assets plus the market value of common equity minus the book value of common equity to the book value of assets. The mandatory retirement policy is set to one if the firm adopted a mandatory retirement policy by age for independent directors and zero otherwise. MONBEN (Monitoring Benefits) is the factor extracted from free cash flow, industry concentration, and the firm's debt. ADVBEN (Advising Benefits) is the factor extracted from R&D expenditure and asset intangibility. Models 2, 4, 6, and 8 represent the second-stage models from the geography-based instrument. Definitions of variables are provided in Appendix A. All control variables are lagged. T-statistics based on robust standard errors are reported in parentheses, and standard errors are clustered by the firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Tobin's Q			
	(1)	(2)	(3)	(4)
Independent variables	OLS	2SLS	OLS	2SLS
Mandatory retirement policy	-0.003	0.696	0.055	1.310*
	(-0.07)	(0.80)	(1.33)	(1.68)
MONBEN	-0.161***	-0.223***		
	(-7.65)	(-5.62)		
MONBEN × Mandatory retirement policy	0.199***	0.613***		
	(6.19)	(3.08)		
ADVBEN			0.407***	0.478***
			(12.30)	(10.36)
ADVBEN × Mandatory retirement policy			-0.058	-0.675***
			(-1.21)	(-2.61)
Firm Size	0.334***	0.340***	0.368***	0.366***
	(21.49)	(17.19)	(22.72)	(17.92)
Firm Age	-0.006	-0.007	-0.004	-0.007
	(-1.31)	(-1.07)	(-1.05)	(-1.14)
Num. of Bus. segments	-0.013***	-0.013***	-0.015***	-0.015***
	(-4.59)	(-3.81)	(-5.44)	(-4.09)
ROA			-0.336***	-0.276***
			(-5.09)	(-3.70)
Num. of Analysts	-0.039***	-0.041***	-0.039***	-0.041***
	(-9.71)	(-9.03)	(-9.70)	(-8.77)
IO	-0.551***	-0.514***	-0.518***	-0.489***
	(-9.05)	(-7.14)	(-8.65)	(-6.81)
Independence Ratio	-0.067	-0.109	-0.065	-0.144
	(-0.94)	(-1.13)	(-0.94)	(-1.50)
Board Size	-0.056***	-0.048***	-0.059***	-0.047***
	(-9.51)	(-6.70)	(-10.14)	(-6.39)
CEO_Chairman	-0.011	-0.015	-0.012	-0.007
	(-0.50)	(-0.54)	(-0.55)	(-0.24)
CEO_Retirement	0.042**	0.087***	0.044**	0.095***
	(2.07)	(3.33)	(2.19)	(3.51)
Classified Board	-0.032	0.011	-0.050	0.007
	(-0.72)	(0.14)	(-1.12)	(0.08)
Constant	1.782***		1.614***	
	(14.97)		(13.38)	
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year
R^2	0.085	0.061	0.101	0.047
Observations	67,534	52,394	68,145	52,859

Appendix A.

Variable definitions

Variable	Definition
Tobin's Q	Tobin's Q is the ratio of the book value of assets plus the market value of common equity minus the book value of common equity to the book value of assets.
FCFA	Free Cash Flow is earnings plus depreciation minus capital expenditure divided by total assets.
Debt	Debt is the ratio of total long-term debt to total assets.
HHI	The Herfindahl index of industry sales is calculated using data on Compustat-listed firms.
Asset Intangibility	Asset Intangibility is one minus Property, Plant, and Equipment over total assets.
R&D	R&D is R&D expenditure over total assets (xrd/at, with xrd=0 if missing)
Firm Size	Firm size is the natural logarithm of the market value of equity.
Firm Age	The number of years since the firm first appeared on CRSP.
Num. of Bus. segments	The number of business segments.
ROA	Return on assets is as income before extraordinary items over total assets.
Num. of Analysts	Num. of Analysts is the number of analysts following the firm in a fiscal year.
IO	IO is the fraction of the firm owned by institutions.
Mandatory retirement policy	An Indicator variable set to one if the firm adopted a mandatory retirement policy by age for the independent directors zero otherwise. (carried forward)
Independence Ratio	Board independence is the ratio of independent directors to the total size of the board.
Board Size	Board size is the number of directors on the board.
CEO_Chairman	An indicator variable is set to one if the CEO is also the chairman of the board of directors and zero otherwise.
CEO_Retirement	An indicator variable is set to one if the CEO is over 65 years old and zero otherwise.
Classified Board	An indicator variable is set to one if the board structure is staggered and zero otherwise.

Appendix B.

Some examples of the mandatory retirement policy in the firms' documents on the EDGAR system:

- Apple Inc. proxy statement on January 11, 2024:

  "After years of dedicated and valuable service, James Bell and Al Gore will be retiring from the Board effective as of the 2024 Annual Meeting, having reached the age of 75."

- Delta Air Lines proxy statement on May 10, 2024 (under the BOARD COMPOSITION AND REFRESHMENT section):

  "Retirement age of 72 for outside directors."

- TARGET CORP proxy statement on April 29, 2024 (under the Corporate governance highlights section):

  "Our director tenure policies include mandatory retirement at age 75 and a maximum term limit of 20 years. These policies encourage Board refreshment and provide additional opportunities to maintain a balanced mix of perspectives and experiences."