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Finance Working Paper N° 1023/2024
November 2024

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Abstract

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Keywords: CEO Succession Planning, CEO-firm matching, CEO Turnover, Firm Performance, Learning, Corporate Governance, Structural Estimation

JEL Classifications: G34, D83, L25, M51

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Abstract

We provide evidence that CEO succession plans reduce the losses associated with CEO turnovers and provide more accurate initial assessments of successors, especially when insiders are appointed, without negatively affecting firm performance when adopted or in place. Building on these findings, we develop and estimate a dynamic learning model featuring costly CEO turnover, plan adoption, and succession decisions. We find that succession plans offer substantial benefits, but boards of directors perceive them as costly. A reform mandating succession plans would increase shareholder value by 3%. The SEC's 2009 policy shift on succession planning improved the adoption rate and succession outcomes.

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1 Introduction

The departure of a CEO is always a significant event for a company. Approximately 10% of the firms listed in the S&P 1500 Index experience a CEO turnover each year (Peters and Wagner (2014); Jenter and Kanaan (2015)), and the associated costs are substantial (Yermack (2006); Taylor (2010)). Predicting when a CEO turnover will occur is challenging, as CEOs step down for many reasons. CEOs can be fired (Parrino (1997); Huson et al. (2001); Kaplan and Minton (2006)), quit for personal and professional motives (Graham et al. (2019); Jenter and Lewellen (2021)), or even suddenly die (Johnson et al. (1985); Bennedsen et al. (2010)). CEO turnovers are especially damaging when companies are caught off-guard. Leaderless firms may spend months resolving a succession dilemma while simultaneously attempting to contain an evolving crisis (Rivolta (2018); Gabarro et al. (2023); Fernández-Aráoz et al. (2021)). In addition, time pressure can lead to hasty decisions, resulting in the selection of an unfit CEO with potentially long-lasting detrimental effects on the company (Bertrand and Schoar (2003); Bandiera et al. (2020); Jenter et al. (2024)).

Since CEO succession is one of the most crucial responsibilities of US boards of directors, one might expect companies to be prepared for the possibility of a CEO departure by having a succession plan. However, what seems logical in theory often fails in practice. Until recently, corporate boards have given scant attention to CEO succession plans. McConnell and Qi (2022) document that even though the number of firms disclosing a CEO succession plan in their annual reports has increased over the last two decades, more than 40% of US public companies still omit having such a plan. On a similar note, the survey of Larcker et al. (2022) indicates that boards devote little time discussing issues related to CEO succession and are unable to name a successor when the departing CEO steps down in a third of cases.

Since the turn of this century, consulting groups and proxy advisory firms have increasingly urged companies to plan for CEO succession. In October 2009, through the Staff Legal Bulletin No. 14E, the SEC effectively eliminated the ability of firms to withhold CEO succession planning information from shareholders under Rule 14a-8(i)(7), mandating the disclosure of CEO succession plans. At the same time, the SEC encouraged companies to rethink their succession policies by reaffirming that succession planning is a critical governance issue that boards should oversee. As a result, a larger number of companies have disclosed the adoption of CEO succession plans in recent years. However, it remains unclear whether these disclosures were the response to changes in the regulatory and economic environment or the result of boards' renewed commitment to mitigate the adverse impact of CEO turnovers through succession planning. In this paper, we study whether adopting a CEO succession plan is merely a formality or a significant governance tool by quantifying the benefits and costs associated with such plans. We also seek to understand whether succession plans add value to companies and, if so, why a substantial fraction of firms still do not adopt them.

We begin our analysis by providing evidence of the effects of CEO succession plans using data on firm performance, CEO careers, and plan adoption and presence. First, we study firm performance around forced CEO turnovers by comparing firms with and without CEO succession plans. We find that firms with a CEO succession plan exhibit significantly better performance around CEO dismissals than those without, as their profitability declines far less during the period considered. Among firms with a plan, we further distinguish between those appointing internal versus external candidates, finding that firms appointing insiders perform better than those appointing outsiders near forced turnover events. These results suggest that CEO succession plans reduce the monetary losses associated with CEO turnovers for shareholders, with more substantial effects during the turnover year when the new CEO is an insider. Plans contribute in two ways: they enhance board readiness to replace underperforming CEOs and minimize the disruption losses caused by turnovers. The first effect holds regardless of whether the new CEO is internal or external, while the second is notably stronger for internal appointees, as promoting an insider provides continuity and stability that mitigate turnover costs. Thus, succession plans prompt boards to initiate the replacement process proactively but significantly reduce turnover losses only when an internal candidate is available to ensure a smooth transition.

Second, we examine the performance of firms led by different types of CEOs during the years of CEO dismissals. We find that firms led by internally promoted CEOs appointed while a plan was in place exhibit a higher forced CEO turnover-performance sensitivity than either firms led by CEOs appointed without a plan or firms led by externally hired CEOs appointed while a plan was in place. These results indicate that CEO succession plans provide boards with more accurate information about potential internal successors, enabling quicker assessments of CEOs' fit with the firm and faster firing decisions. By engaging in succession planning, boards actively scout and prepare potential candidates through interviews, mentorship, and training initiatives. As a result, boards gain a more precise understanding of internal candidates' abilities at the start of their tenure, relying on the insights gained during the selection process to make decisions. This enhanced understanding is generally limited to internal candidates appointed under a plan, as other types of candidates do not undergo the same scrutiny and preparation. Therefore, succession planning aids boards by improving the quality of the information about internally appointed CEOs.

Third, we analyze firm performance around CEO succession plan adoptions and find no significant drop in the adoption year or decline in subsequent years. These patterns suggest that CEO succession plans do not impose substantial financial burdens on firms, as they neither negatively impact firm performance when disclosed nor while in place. This evidence supports the thesis that CEO succession plans do not entail significant pecuniary costs to firms. Given the benefits mentioned previously, this lack of a negative impact suggests that boards face personal costs rather than financial constraints when deciding whether to adopt a succession plan. These personal costs may include the time and resources required to identify and cultivate successor candidates and the risk of straining relationships with the current CEO, who might view succession planning as a lack of confidence and a heightened risk of being replaced, potentially leading to retaliation. Because of the potential selection effects and unobservable factors driving these patterns, our findings do not establish causality but offer insights into how succession plans shape board decision-making and highlight the frictions that might discourage plan adoption.

Based on this evidence, we develop a dynamic model featuring a representative board of directors of a firm that learns over time about its CEO's ability. The board decides whether to fire the CEO, adopt a CEO succession plan, and, if a plan has been adopted, whether to use it in succession decisions. The plan offers two main benefits: saving CEO turnover costs and providing a more precise estimate of a potential internal successor's ability. This estimate is inferred from a signal that the board receives in each period about the ability of the most promising internal candidate. The signal enables the board to make informed decisions about whether to promote an insider or seek an external candidate if none of the internal candidates are deemed apt for the CEO role. If the signal reveals a poor fit, the plan allows the board to avoid appointing an internal candidate who may not be the right manager. However, if the board opts for an outsider, the plan's strategies for minimizing disruption losses are ineffective, and the full turnover costs are incurred.

The board makes its decisions to maximize its utility, which reflects both the shareholder value and the misalignments between directors and shareholders regarding firing and plan adoption decisions. Specifically, firing a CEO entails a pecuniary cost to shareholders due to payments and disruption losses associated with CEO dismissal, as well as a personal cost to the board members. The personal cost stems from the discomfort with dismissing the CEO for personal and professional reasons, the risk of losing their directorship, the uncompensated effort required, and other reputational damages that may affect future board appointments (Hermalin and Weisbach (1998); Von Meyerinck et al. (2023)). Adopting a succession plan also imposes its own personal cost on the board members, arising from the uncompensated effort and stress of managing the succession process and the potential tensions with the CEO.

The model generates several novel predictions about the decisions to adopt and use a CEO succession plan, and how boards make firing decisions when a plan is in place. We structurally estimate the model parameters using the simulated method of moments (SMM), an approach that overcomes the challenges posed by the endogeneity of board decisions and the unobservability of key model elements, such as the CEO's actual and perceived ability. The SMM approach allows us to infer the magnitudes of the model elements and conduct counterfactual experiments. Our parameter estimates indicate that directors face a substantial personal adoption cost. Boards behave as if adopting a plan costs an estimated 4% of firm assets. This high estimated cost helps explain the low adoption rate in the data. Furthermore, the estimates reveal that plans reduce the pecuniary CEO turnover costs by up to one-third and yield successor assessments that are 25% more accurate.

We also estimate our model on various subsamples. Our findings indicate that large firms, firms with a high number of directors, and firms with high institutional ownership experience lower agency conflicts regarding planning decisions and are more effective at managing succession. Additionally, the policy shift of the SEC in 2009 successfully encouraged boards to adopt CEO succession plans, improve CEO selection, and facilitate smoother transitions.

We run two sets of counterfactual experiments to evaluate the benefits of succession plans and the impact of potential policy reforms. The results from the first set highlight that both reducing CEO turnover losses and obtaining more precise information about CEO successors are key drivers of the adoption decision. Removing the first benefit reduces the adoption rate by 16.6%, while removing the second reduces it by 13.1%. Interestingly, the second benefit has a greater impact on shareholder value than the first. This finding underscores the critical importance of learning a CEO successor's ability more quickly, even more so than reducing turnover losses. The results from the second set show that a reform mandating firms always have a CEO succession plan in place would increase shareholder value by 3.1%. In contrast, a reform requiring both a plan and internal succession would have a less favorable outcome, as it would limit the board's possibility to consider external candidates.

We contribute to several strands of the literature. First, we add to the empirical literature about CEO succession planning (Naveen (2006); Rivolta (2018); McConnell and Qi (2022); Cvijanovic et al. (2023)). Like recent works (McConnell and Qi (2022); Cvijanovic et al. (2023)), we adopt a direct definition of CEO succession planning by collecting information about CEO succession plan disclosures from firm proxy filings. We document new evidence by examining firm profitability dynamics around forced CEO turnover and plan adoption events, helping to characterize both the benefits and costs of succession plans. Moreover, we employ a structural approach, which allows us to quantify the underlying forces and examine potential policy reforms. Methodologically, our paper belongs to the structural estimation literature in corporate governance (Taylor (2010); Taylor (2013); Morellec et al. (2012); Morellec et al. (2018); Nikolov and Whited (2014); Glover and Levine (2017); Hamilton et al. (2024); He and Schroth (2024)). We extend this literature by studying a new topic, CEO succession planning, and quantifying its benefits and costs. Finally, our paper responds to the call of Edmans et al. (2017) to understand better the lack of CEO succession planning. To our knowledge, we are the first to develop and structurally estimate a theoretical framework that incorporates the documented stylized facts, explicitly addressing both the importance of having a plan and the board's choice of whether to use it.

The paper is organized as follows. In Section 2, we provide empirical evidence about CEO succession plans. In Section 3, we introduce and analyze the model. In Section 4, we discuss our structural estimation and identification strategy along with our findings. In Section 5, we conclude. The Internet Appendix provides additional details.

2 Empirical Evidence

In this section, we provide evidence that:

1. CEO succession plans reduce the pecuniary losses associated with CEO turnovers, and their effect is more pronounced when the new CEO is appointed internally.

2. CEO succession plans enhance the accuracy of the information about successors when the new CEO is appointed internally.

3. CEO succession plans do not impose significant pecuniary costs on firms, either at the time of adoption or while in place.

We begin by describing the data used in the analysis of this section and the structural estimation of the model described in the next section. Next, we present the results of our empirical tests. We then use the observed relationships to discipline our model.

2.1 Data

Firms' accounting data are from Compustat. We keep observations of firms incorporated in the US with non-missing and non-negative book assets and sales. We define firm total profitability as the return on assets (ROA), computed by dividing operating income before depreciation by the average book assets in the current and previous year. We omit observations with ROA missing or greater than 100% in absolute value and yearly winsorize this variable at the 1% and 99% levels. We define industry profitability as the yearly industry average ROA using the Fama and French 12 industry classification. We compute this measure considering the largest 3,000 firms in Compustat by their book assets in a given year. Given their size, these firms represent the most relevant competitors for the large companies in our sample. We subtract the industry profitability from each firm ROA to measure firm excess profitability, which we use as our metric of firm-specific profitability.

Data about CEOs' characteristics are from ExecuComp. We employ a cleaning procedure similar to that in Taylor (2013). We classify CEO turnovers into forced and voluntary using the data provided by Peters and Wagner on WRDS (see Peters and Wagner (2014) and Jenter and Kanaan (2015)). Consistent with the literature, a CEO is labeled an internal successor if the executive worked at the firm for at least one year before becoming CEO.

We collect information about firms' disclosures of CEO succession plans using the method of McConnell and Qi (2022). We employ a crawling algorithm to search the SEC proxy filings on the SEC EDGAR website for four keyword phrases: "succession planning," "succession plan(s)," "management development," and "leadership development." If any of these phrases are identified, we search in the same paragraph for one of four other keyword phrases: "CEO," "chief executive officer," "president," and "key executive." If a paragraph in a proxy filing contains such phrasing, we consider this disclosure to indicate the adoption of a CEO succession plan, provided that it is the first time this information is reported during a CEO's tenure and no CEO turnover occurs in the same year. As in Cvijanovic et al. (2023), we assume that a CEO succession plan is in place from the year following its adoption until the subsequent CEO turnover. This assumption is reasonable, since a board typically needs multiple months to interview, select, and train CEO candidates and develop succession strategies. Moreover, each plan is shaped by the company's current business direction and leadership, requiring boards to reassess potential CEO transitions based on evolving circumstances. Consequently, changes in the number of firms with a plan depend on firms deciding to adopt a plan, net of those firms experiencing a CEO turnover. Our final sample spans from 1998 to 2018. The Internet Appendix provides additional details on how we construct the sample.

Table 1 presents sample summary statistics related to events, firms, and CEOs. Panel A reports statistics on CEO turnovers, CEO succession plan adoptions, and the presence of plans. Column (3) shows that the turnover rate is 12%, while column (5) indicates that the forced turnover rate is 3%. Column (7) reveals that the plan adoption frequency is 8%, which implies that 34% of our observations have a plan in place, as displayed in column (9). Panel B provides statistics on firm characteristics for the full sample and firm-year observations with and without a CEO succession plan. Column (2) indicates that our sample comprises large and profitable firms based on their book assets and profitability metrics. Comparing columns (5) and (8), firms with a plan are more than twice as large as those without one, though both types perform similarly. Panel C summarizes CEO characteristics. During our sample period, 3,448 CEOs were hired, with 38% (62%) hired by firms with (without) a plan when succession occurred. From columns (2) and (4), firms with a plan internally promoted their CEOs 80% of the time, while, from columns (6) and (8), those without did so 77%.

Table 1: Summary Statistics

This table presents statistics about events, firms, and CEOs for the period 1998 to 2018. Panel A reports the number of firm-year observations in column (1), the number and fraction with a CEO turnover in columns (2) and (3), the number and fraction with a forced CEO turnover in columns (4) and (5), the number and fraction with a CEO succession plan adoption in columns (6) and (7), and the number and fraction with a CEO succession plan in place in columns (8) and (9). Table B.1 provides a year-by-year breakdown. Panel B reports the number of observations, mean, and standard deviation for firm characteristics for our entire sample and observations with and without a CEO succession plan. The firm characteristics are book assets (in billions of US dollars), ROA, and firm excess profitability. The variables used to compute the ROA, including book assets, are normalized in 2018 US dollars beforehand. We yearly winsorize the ROA at the 1% and 99% levels. Panel C reports the number of CEOs hired during our sample period in column (1), the number and fraction hired with a plan in place in columns (2) and (3), the number and fraction internally promoted with a plan in place in columns (4) and (5), the number and fraction hired without a plan in place in columns (6) and (7), and the number and fraction internally promoted without a plan in place in columns (8) and (9).

Panel A: Events

	No. (1)	No. T/O (2)	Frac. with T/O (3)	No. Forced T/O (4)	Frac. with Forced T/O (5)	No. Adopting (6)	Frac. Adopting (7)	No. with Plan (8)	Frac. with Plan (9)
	36387	4219	0.12	1050	0.03	3037	0.08	12265	0.34

Panel B: Firms

		Total			With Plan			Without Plan	
	No. (1)	Mean (2)	Std (3)	No. (4)	Mean (5)	Std (6)	No. (7)	Mean (8)	Std (9)
Total Assets	36387	19.69	122.96	12265	31.22	157.76	24122	13.83	100.25
ROA	36387	0.12	0.12	12265	0.12	0.10	24122	0.12	0.13
Firm Excess Profitability	36387	0.01	0.12	12265	0.01	0.09	24122	0.01	0.13

Panel C: CEOs

	CEOs (1)	CEOs Hired with Plan (2)	Frac Hired with Plan (3)	CEOs Internally Promoted with Plan (4)	Frac Internally Promoted with Plan (5)	CEOs Hired without Plan (6)	Frac Hired without Plan (7)	CEOs Internally Promoted without Plan (8)	Frac Internally Promoted without Plan (9)
	3448	1296	0.38	1031	0.30	2152	0.62	1648	0.48

2.2 The Saving Effect

CEO succession plans mitigate the pecuniary losses associated with CEO turnovers, and these reductions are more significant when CEO successors are internally appointed. Figure 1 illustrates the average firm excess profitability around different types of forced CEO turnovers. Its time window spans from 5 years before to 5 years after a firing event.

In Panel (a), we examine the impact of CEO succession plans by analyzing the performance of firms with and without a plan in place at the time of the event. The blue line represents the former case, while the orange line represents the latter. Comparing the two lines reveals that, with a plan, average firm excess profitability (i) does not decline as much (-2% versus -5%), and (ii) drops less from the year before to the year of a firing (-1.7% versus -2.6%), compared to when there is no plan. We also find that, after firings, the average firm excess profitability remains statistically significantly negative for a shorter duration with a plan (1 year) than without a plan (5 years). Moreover, the difference between the averages is statistically different at the 95% confidence level from the year before the forced CEO turnover onward. This evidence reveals that having a CEO succession plan when a forced CEO turnover occurs attenuates the monetary losses associated with the latter event and has long-lasting effects.

In Panel (b), we study the differential impact of the board selecting an internal versus an external candidate as the next CEO when a plan is in place. The light blue line represents the former case, while the dark blue line represents the latter. The patterns of this panel mirror those of the previous one: when an internal candidate is appointed, the average firm excess profitability (i) falls less (-1.3% versus -2.8%), and (ii) decreases less from the year before to the firing year (-1.5% versus -2%), compared to when an external candidate is appointed. Additionally, after dismissals, the average firm excess profitability is not statistically significantly negative when an internal candidate is appointed. In contrast, it remains so for two years when an external candidate becomes the next CEO, with recovery beginning after a 1-year delay. Although we lack sufficient statistical power to uncover significant differences between the two averages, with 197 cases of internal and 107 cases of external candidate appointments after a firing, respectively, this decomposition suggests that appointing a candidate who worked at the firm for at least a year before a forced turnover further reduces the losses associated with firing the incumbent CEO. This effect is mainly due to the effectiveness of the succession plan's strategies at reducing the disruption costs rather than a lack of readiness to force a CEO succession, since the gap between the two averages only becomes notable from the firing.

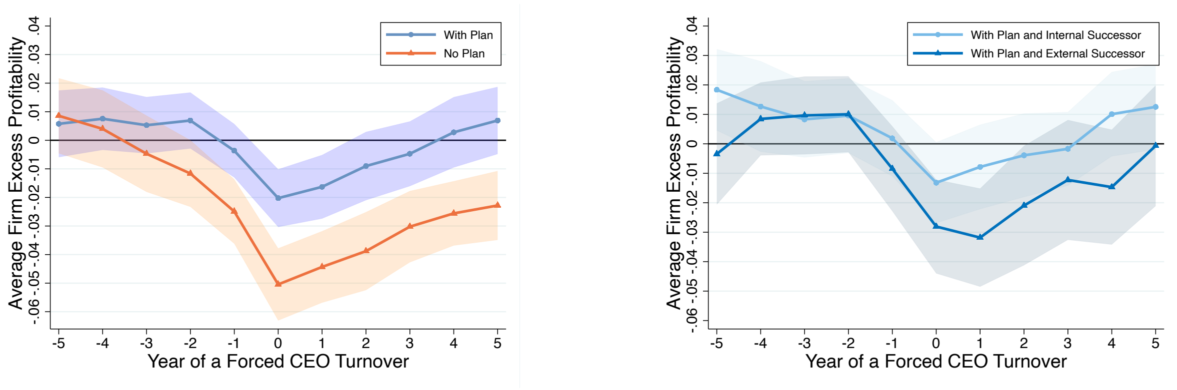
These results do not imply that boards' decisions to appoint external candidates are sub-optimal. Indeed, the gap between the two lines in Panel (b) stops growing one year after the firing event. If directors choose an outsider as the next CEO, it is likely because they did not consider internal candidates as suitable leaders for the firm or chose to give its firm a different business direction, thus deeming an outsider candidate to be a better fit. As documented by Parrino (1997), such decisions are not uncommon during turnovers, as these events often lead to changes in the boards and governance of public firms. However, when a board hires an outsider candidate, the plan is ineffective at reducing the disruption costs.

Contrasting the two graphs reveals that CEO turnover losses are larger when firms do not have a plan than when they have one, even when boards appoint external candidates. The advantages of a plan are due to two separate effects: (i) enhancing board readiness to replace poorly performing CEOs and (ii) minimizing the disruption costs caused by CEO turnovers. The first effect comes from having potential CEO candidates ready to succeed and programmed strategies. The second effect is due to the effectiveness of the plan policies in promoting a smooth change and stability during the transition. However, when a board hires an external candidate while a plan is in place, the strategies no longer apply because boards hire outsiders to bring changes to firms. As a result, firms experience a pronounced decline in performance in the firing year, almost as if they do not have a plan.

We observe dynamics supporting our story when considering voluntary CEO turnovers. Specifically, the average firm excess profitability remains stable and positive around voluntary turnovers when a CEO succession plan is in place. In contrast, it turns negative in the year of the event when there is no plan. An analogous decomposition reveals that, with a plan in place, the type of CEO appointed affects the trajectory of the firm excess profitability. We also confirm that firm profitability around a forced CEO turnover does not differ according to whether boards appoint internal and external candidates when firms do not have a plan. This evidence indicates that the differences in the graphs are due not only to the type of candidate appointed as CEO successor but also the presence of a CEO succession plan. The gap between the lines in Panel (b) of Figure 1 from the dismissal year onward relates to the choice of using a plan, that is, to promote an internal candidate and adhere to its strategies.

These findings are further corroborated in Table 2, which presents the results of linear regressions of firm excess profitability on dummy variables indicating the occurrence of (i) a CEO turnover, (ii) a CEO turnover with a CEO succession plan in place, and (iii) a CEO turnover with a plan in place and the appointment of an internal candidate as the new CEO. Columns (1) and (4) consider the first two dummies, columns (2) and (5) the first and third dummies, and columns (3) and (6) all three dummies. The first three columns focus on forced CEO turnovers, as in the graphs, while the subsequent columns consider all turnovers. All regressions include a constant, and year and industry fixed effects. We adopt the Fama and French 12 classification to maintain consistency with the data construction.

The coefficient of the CEO turnover dummy is negative and close in magnitude across the three different specifications considered for each turnover type, underscoring the significance of the pecuniary losses due to turnovers. The coefficient of the CEO turnover with a CEO



(a) With vs Without Plan (b) Internal vs External Successor

Figure 1: The Saving Effect of CEO Succession Plans

This figure shows the average firm excess profitability from 5 years before to 5 years after a firing. The blue (orange) line in Panel (a) represents firms that had (did not have) a CEO succession plan in place in the turnover year. The blue (orange) shaded area indicates the 95% confidence interval for firms that had (did not have) a plan. The light blue (dark blue) line in Panel (b) represents firms that had a CEO succession plan and appointed an internal (external) candidate as CEO successor. The light blue (dark blue) shaded area indicates the 95% confidence interval for firms that appointed an internal (external) candidate.

succession plan dummy is positive in all the regressions where it serves as a control, highlighting how the presence of a plan reduces the CEO turnover losses, as boards are more prone to fire poorly performing CEOs. Additionally, the coefficient of the CEO turnover with a plan and internal successor dummy is larger than the coefficient on the second dummy when comparing the results of columns (1) versus (2) and (4) versus (5), confirming that a CEO succession plan reduces turnover losses more effectively when the board appoints an internal candidate than when it hires an outsider. This result is further confirmed by columns (3) and (6), where the coefficients on both the second and third dummies are positive. In summary, we provide evidence that CEO succession plans reduce firms' losses due to CEO turnovers, especially when the new CEO is appointed internally. Our findings are consistent when considering voluntary CEO turnovers, more granular industry or firm fixed effects, and CEO controls, such as the log of CEO age and of CEO tenure, firm controls, such as the log of book assets, leverage, market-to-book, and sales growth rate, and governance controls, such as the institutional ownership, board size and fraction of independent directors.

2.3 The Learning Effect

CEO succession plans help boards of directors evaluate the ability of internally appointed CEO successors more accurately, enabling quicker decisions on whether to retain them. Figure 2 shows the average firm excess profitability from 3 years before to the year of a forced CEO turnover event of different types of CEOs. Specifically, we consider internally promoted

Table 2: Regressions of Firm Excess Profitability by Turnover Type

This table presents the results of linear regressions where firm excess profitability is regressed on a dummy that equals 1 if a CEO turnover occurs, along with a dummy that equals 1 if a CEO turnover occurs while a CEO succession plan is in place in columns (1) and (4), a dummy that equals 1 if a CEO turnover occurs while a CEO succession plan is in place and an internal candidate is appointed as CEO successor in columns (2) and (5), and both dummies in columns (3) and (6). Columns (1), (2), and (3) focus only on forced CEO turnover events, while columns (4), (5), and (6) consider all the CEO turnover events. All the regressions include year and industry fixed effects and a constant term. Standard errors are heteroskedasticity-robust, clustered at the firm level and reported in brackets. Superscripts *, **, and *** correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Turnover	-0.060***	-0.056***	-0.060***	-0.030***	-0.028***	-0.030***
	(0.006)	(0.005)	(0.006)	(0.003)	(0.003)	(0.003)
Turnover × Plan	0.029***		0.020**	0.025***		0.010*
	(0.008)		(0.009)	(0.004)		(0.005)
Turnover × Plan × Internal Successor		0.033***	0.018*		0.031***	0.023***
		(0.009)	(0.010)		(0.004)	(0.005)
Constant	0.011*	0.011*	0.011*	0.013**	0.013*	0.013**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Turnover Type	Forced	Forced	Forced	All	All	All
Observations	36387	36387	36387	36387	36387	36387
R^2	0.015	0.015	0.016	0.014	0.015	0.015

CEOs appointed while there was a plan in light blue, externally hired CEOs appointed while there was a plan in dark blue, and CEOs appointed without a plan in orange.

The graph reveals that firms led by internally appointed CEOs with a succession plan have consistently higher average firm excess profitability than firms led by other types of CEOs in the years preceding a firing. Moreover, in the firing year, the performance of these companies is closer to that of firms with other CEOs three years before than in the firing year. The profitability gap between these firms and others grows and approximately doubles during the period considered. In the year of the dismissal, the average performance of firms with internally appointed CEOs with a plan is the only one that is not statistically negative, and it is different at the 95% confidence level from that of firms led by other types of CEOs.

These dynamics suggest that boards are more likely to dismiss an internally appointed CEO with a plan before the firm performance significantly declines compared to other CEOs. Directors fire internally appointed CEOs with a plan without waiting for the firm performance to plummet, as if they already have enough information from the CEO selection period. Instead, they appear more reluctant to fire other types of CEOs, as if they need to collect more information about their executives' fit with their firm.

Focusing on the performance dynamics up to voluntary turnovers, we do not observe similar patterns. We also look at the evolution of the variance of the cumulative persistence-adjusted firm-specific profitability conditional on a given level of CEO tenure. Similar measures are used in Hamilton et al. (2024) and in Taylor (2010) and Taylor (2013) to proxy for the accuracy of the information available about a CEO. This analysis reveals that the variance of the internally appointed CEOs with a plan is significantly lower than that of the other categories during the first year of tenure (from 3.1 to 3.8 times lower, to be specific), and the difference among CEO types starts to disappear only on the 6th year. These patterns indicate that boards learn about their CEO's ability over time, and their initial information about internally appointed CEOs with a plan is more accurate than that about other types of CEOs. When they have a plan, boards collect more precise information about their internal candidates through extensive interviews and training sessions compared to when they do not. Plans allow directors to choose an internal candidate only if the assessment is good enough and to learn faster about the CEO's ability to decide whether to retain or dismiss this executive. Over time, the gap among variances shrinks, revealing that the informational advantage vanishes. Independent of types, only high-performing CEOs will keep their job as sufficiently long periods pass.

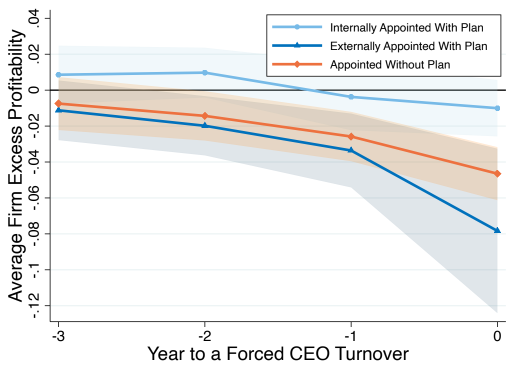


Figure 2: The Learning Effect of CEO Succession Plans

This figure shows the average firm excess profitability from 3 years before to the year of a forced CEO turnover of three types of CEOs. The light blue line represents internally promoted CEOs appointed while a CEO succession plan was in place, and the light blue shaded area indicates the 95% confidence interval. The dark blue line represents externally hired CEOs appointed while a CEO succession plan was in place, and the dark blue shaded area indicates the 95% confidence interval. The orange line represents CEOs appointed without a CEO succession plan, and the orange shaded area indicates the 95% confidence interval.

Table 3 complements the evidence of the previous figure by estimating forced CEO turnover regressions using a Cox (1972) proportional hazard model. We control for lagged firm excess profitability and year and industry fixed effects and treat voluntary CEO turnovers as right-censored observations in the estimation. In each column, we consider only observations of firms led by one of our types of CEOs: internally appointed while a plan was in place in column (1), externally appointed while a plan was in place in column (2), and appointed while there was no plan in column (3).

We find that the likelihood of CEO dismissal increases with low performance, and the effect is stronger for firms led by internally appointed CEOs with a plan. Their hazard ratio equals 8%, while this measure ranges from 15% to 18% for the other types. Therefore, these results also support the hypothesis that having a plan and using it by promoting an internal candidate to CEO allows the board to save time and money by obtaining more precise initial information about the new CEO. This analysis also underlines that considering the distinctions between internally versus externally appointed CEOs and between CEOs appointed with and without a plan separately would not give a complete picture. These findings hold controlling for year fixed effects and for whether a CEO is at retirement age, that is, 63 or older, and a CEO has high equity ownership, that is, more than 5% of the outstanding shares, as in Jenter and Kanaan (2015).

Table 3: Regressions of Forced CEO Turnover by CEO Type

This table presents the results of Cox hazard regressions predicting forced CEO turnovers using lagged firm excess profitability for different types of CEOs. Specifically, in column (1) we consider only observations of firms led by CEOs who were internally promoted while a plan was in place, in column (2) we consider only observations of firms led by CEOs who were externally hired while a plan was in place, in column (3) we consider only observations of firms led by CEOs appointed while a plan was not in place. All the regressions include year and industry fixed effects. Standard errors are heteroskedasticity-robust, clustered at the firm level and reported in brackets. Superscripts *, **, and *** correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Firm Excess Profitability	-2.517***	-1.733	-1.895***
	(0.589)	(1.059)	(0.337)
CEO Type	Internally Appointed With Plan	Externally Appointed With Plan	Appointed Without Plan
Observations	4763	896	11031

2.4 The Nonnegative Effect on Performance

CEO succession plans have no adverse impact on firm excess profitability, either in the year of adoption or while they are in place. Figure 3 illustrates the average firm excess profitability from 3 years before to 3 years after adopting a CEO succession plan.

Throughout the entire period considered, firm profitability remains relatively stable. Consistent with the evidence of Cvijanovic et al. (2023), it slightly decreases in the years leading up to the adoption of a CEO succession plan, as boards might decide to adopt a plan to prepare their firms for a leadership change. De facto, two scenarios prompt boards to adopt plans: a CEO leaving and a CEO firing. Hence, declining firm performance may encourage directors to adopt a plan to ensure a smooth transition if they decide to fire their CEO. Further evidence supporting this explanation includes the positive correlation between forced CEO turnovers and the presence of CEO succession plans and the higher frequency of CEO dismissals when a succession plan is in place compared to when it is not. Unlike CEO turnovers, the average performance does not significantly drop in the year of adoption and remains constant and positive in the subsequent years. These findings align with those of McConnell and Qi (2022), who document a positive stock market reaction around the announcement date of a CEO succession plan adoption for large firms such as those in our sample, implying that plans are value-enhancing for these companies. Our results support the hypothesis that CEO succession plans do not negatively affect firm performance.

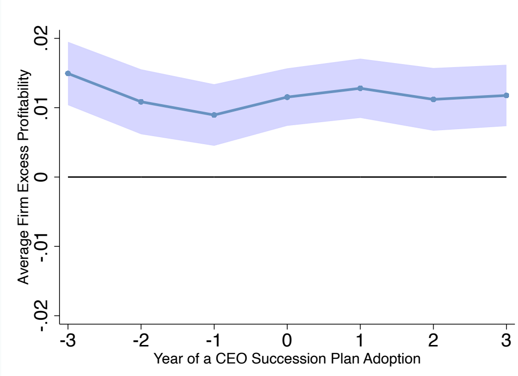


Figure 3: The Nonnegative Impact on Performance of CEO Succession Plans

This figure shows the average firm excess profitability from 3 years before to 3 years after the adoption of a CEO succession plan. The blue shaded area indicates the 95% confidence interval.

We integrate our analysis in Table 4, which shows the results of regressions of firm excess profitability on a dummy variable that equals 1 if a CEO succession plan is in place and 0 otherwise, and a constant term. We use year and industry fixed effects in columns (1) and (2), and year and firm fixed effects in columns (3) and (4). Additionally, in columns (2) and (4), we control for CEO, firm and governance controls. Across all specifications, the coefficients on the dummy indicating the presence of a plan are positive and statistically significant. Even if significant, these coefficients are small, indicating a tiny effect on firm performance, probably due to the attenuation of turnover losses documented above. These findings suggest that firms' lack of succession planning is not due to the possibility that adopting a plan will cause losses from CEOs' lack of effort or the board's inattention.

In sum, we provide evidence that firms do not incur significant pecuniary costs when they adopt a CEO succession plan and that the presence of a plan does not hurt a firm performance. Since many governance choices, including adopting a CEO succession plan, are endogenous and often the response to unobservable factors, the exercises presented in this section are not tests for causality. Nonetheless, they are still informative for the next

Table 4: Regressions of Firm Excess Profitability Around CEO Succession Plan Adoptions

This table presents the results of linear regressions of firm excess profitability on a dummy that takes value 1 if a CEO succession plan is in place and 0 otherwise. The first two regressions use year and industry fixed effects, while the third and fourth regressions use year and firm fixed effects. All regressions include a constant term. In columns (2) and (4), we include CEO controls, namely, the natural log of CEO age and of CEO tenure, firm controls, namely, the natural log of book assets, leverage, Tobin's q, and sales growth rate, and governance controls, namely, the institutional ownership, log of board size, and fraction of independent directors. Standard errors are heteroskedasticity-robust, clustered at the firm level and reported in brackets. Superscripts *, **, and *** correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Plan Present	0.011***	0.006**	0.004**	0.003*
	(0.003)	(0.003)	(0.002)	(0.002)
Additional Controls	No	Yes	No	Yes
Observations	36387	25844	36387	25844
R^2	0.012	0.203	0.016	0.133

part of the analysis, where we build and structurally estimate a model featuring a board that has the option to adopt a CEO succession plan. If the board uses the plan during a turnover, meaning the directors promote an internal candidate to the CEO office, it offers two benefits: it reduces the CEO turnover disruption costs and provides more accurate information about the CEO successor. While the plan does not entail any pecuniary cost to the firm, the board of directors bears a personal utility cost from adopting a plan, as this action could hurt their relationship with the incumbent CEO and their careers.

3 Model

In this section, we present the dynamic learning model featuring costly turnover, plan adoption, and succession decisions. We describe its environment and then discuss its predictions.

3.1 Environment

The model features a firm that operates for an infinite number of periods t and its board of directors. The firm is led by a CEO who stays in office at most $\overline{\tau}$ periods and might voluntarily leave the firm (retire or quit) in any period with an exogenous probability $q(\tau_t)$, where τ_t is the number of periods served. Although this probability could depend on other factors, we assume this form for parsimony. Our sample's lack of a significant negative (positive) relation between voluntary turnovers and firm performance (plan adoption) supports this choice. We denote the event a CEO voluntarily leaves in period t using the indicator $l_t \in \{0, 1\}$, where $l_t = 0$ indicates that the CEO stays, and $l_t = 1$ means the CEO leaves.

The board makes three choices. First, if the CEO does not leave, the board decides whether to fire or keep her. We denote this decision by $f_t \in \{0, 1\}$, where $f_t = 1$ indicates that the board fires the CEO, and $f_t = 0$ means it keeps her. Second, if there is no CEO turnover and the firm has no CEO succession plan, the board decides whether to adopt one. We denote this decision by $a_t \in \{0, 1\}$, where $a_t = 1$ indicates that the board adopts a plan, and $a_t = 0$ means it does not. If the adoption occurs in period t, the plan is in place from period $t + 1$ until a CEO turnover occurs, as assumed in the previous section. We denote the presence of a plan using the indicator $p_t \in \{0, 1\}$, where $p_t = 1$ indicates that the board has adopted a plan during the current CEO's tenure, and $p_t = 0$ means it has not. Finally, conditional on a CEO turnover occurring and the firm having a CEO succession plan, the board decides whether to use the plan and promote an internal candidate as CEO successor or discard the plan and hire an external CEO. We denote this decision by $u_t \in \{0, 1\}$, where $u_t = 1$ indicates that the board uses the plan, and $u_t = 0$ means it does not.

The firm has book assets B_t that are constant over time. For tractability, we assume all the cash flows are paid out to the shareholders when positive and frictionlessly raised through external financing when negative. The firm has a production technology that generates time t profits $Y_t B_t$, where Y_t is the profitability rate which equals

$$Y_t = x_t + y_t. \tag{1}$$

The first component, x_t, represents an industry profitability rate, while the second one, y_t, is a firm-specific profitability rate that evolves as a mean-reverting process around α, the current CEO's ability level,

$$y_t = \phi\alpha + (1 - \phi)y_{t-1} - c^{firm}(f_t + l_t)(1 - \chi p_t u_t) + \varepsilon_t. \tag{2}$$

The parameter $\phi \in (0, 1)$ controls the persistence of this process. The parameter c^{firm} represents the pecuniary costs of a CEO turnover, that is, all the payments such as retirement or severance packages and disruption costs that affect firm profitability in the event of the departure of a CEO. The parameter $\chi \in [0, 1]$ captures the degree to which these costs decrease if a CEO succession plan is in place and used, that is, the effectiveness of the plan strategies. The modeling choices in equation (2) about the third term and the absence of a plan's pecuniary cost are based on the evidence of Section 2.2 and Section 2.4, respectively. Finally, ε_t is an independently and normally distributed shock with mean 0 and variance σ_ε^2. We omit any firm- or CEO-specific subscripts to simplify the notation.

By equation (2), the higher the CEO's ability level α, the higher the long-run average firm-specific profitability. Moreover, α is constant over time, as indicated by the absence of a time subscript. Assuming α is also independently and identically distributed across firm-CEO pairs, we can view it as a measure of synergy between a given executive and a given firm. The value of this synergy is assumed to be unknown to the board, as directors cannot separately observe α and the realization of ε_t. As a result, when firm-specific profitability y_t is high, the board cannot distinguish whether this is due to a good CEO (that is, one with a high α) or luck (that is, a high ε_t). Furthermore, since the firm-specific profitability is persistent, a good (bad) CEO might have a poor (high) initial performance because of the predecessor and a long-lasting positive (negative) effect on the firm's profitability.

The board learns about the incumbent CEO's ability α over time to make informed decisions. All CEOs are drawn from the same talent pool, normally distributed with mean μ_0 and variance σ_0^2. The board's initial prior beliefs about a CEO candidate match the distribution of ability of the pool, $\mathcal{N}(\mu_0, \sigma_0^2)$. If the firm does not have a CEO succession plan, these are the board's initial beliefs about a new CEO. Thus, μ_0 represents the average quality of the pool and the initial assessment of a new CEO's contribution to the firm performance, while σ_0 captures the dispersion of the pool and the initial uncertainty about a new CEO. If the firm has a succession plan, the board receives a signal about the most promising internal candidate in that period, w_t, normally distributed with mean equal to the candidate's ability and variance σ_w^2. The board receives w_t each period a plan is in place and uses it to update the beliefs about this candidate. If a turnover occurs because either the CEO leaves or the board dismisses her, the directors decide whether to promote the most promising internal candidate or to hire an external candidate for whom the board's initial beliefs match those of a new CEO without a plan. Hereafter, we will refer to the most promising internal candidate as planned and all other candidates as non-planned.

The initial signal w_t encompasses the additional information the board gathers during the planned candidate's training period and from in-depth job interviews. Due to time constraints and lack of preparation, the board does not have these opportunities with non-planned candidates. The lower the volatility parameter σ_w, the more precise the initial signal, and the more significant the uncertainty gap between planned and non-planned candidates. If the board does not appoint the planned candidate and no turnover occurs, we assume it treats the planned candidate as a different individual in subsequent periods. In other words, we do not assume a multi-period learning about the planned candidate. We employ this assumption for two reasons. First, the roster of potential CEO successors might change over time, as up-and-coming executives might be poached by other companies or decide to pursue other job opportunities while on standby, and newly hired executives might impress the board and become top candidates. Second, a turnover often brings significant changes to a firm's governance and strategic direction, leading the board to reassess the ideal CEO profile. Thus, the signal w_t only becomes relevant if the board considers a turnover, as the firm's needs may evolve based on its circumstances. The assumption regarding w_t enables us to capture both these dynamics without specifying how the CEO selection process occurs or the reasons behind a board decision to appoint a non-planned candidate.

The assumption about w_t aligns with the findings of Section 2.3. A more precise estimate of a CEO's ability reduces the uncertainty about a given firm-CEO match quality at the start of tenure, allowing the board to learn faster about the CEO. We do not assume different pool means for planned and non-planned candidates because, as shown in Section 2.2, the post-turnover performance trends do not notably differ between the two groups. This choice is consistent with the evidence of He and Schroth (2024), who find small differences in productivity between internal and external candidates, which unknown heterogeneous firm-CEO match qualities can explain. Conceptually, this setting is isomorphic to one with two candidate pools, one of planned and one of non-planned candidates, with same means but different variances. Specifically, the dispersion of the pool of planned candidates is smaller than that of non-planned candidates. After the turnover, the board updates its estimate of the CEO's ability via Bayes' rule by observing the realization of the firm-specific profitability y_t in each period.

The board decides whether to fire the CEO, $f_t \in \{0, 1\}$, adopt a plan, $a_t \in \{0, 1\}$, and use the plan, $u_t \in \{0, 1\}$, to maximize its lifetime utility V_t

$$V_t = \max_{\{f_{t+s}, a_{t+s}, u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t \left[\sum_{s=0}^{+\infty} \beta^s v_{t+s} \right], \tag{3}$$

where $\beta \in (0, 1)$ is the discount factor of the economy, and v_t is the board's per-period utility

$$v_t = \kappa Y_t B_t - c_f^{board} B_t f_t - c_a^{board} B_t (1 - p_t) a_t. \tag{4}$$

The first component captures the board's preference for higher firm profits, and the parameter $\kappa > 0$ controls how much the board cares about the shareholder value. The parameter c_f^{board} represents the personal cost to the board of firing the CEO. This cost includes the board members' loss of an ally both within and outside the firm, as well as the reputation cost the directors incur if they dismiss the CEO. Directors involved in forced turnovers face a large risk of losing their board seats at the firm or outside (Von Meyerinck et al. (2023)). The parameter c_a^{board} is the personal cost to the board of adopting a CEO succession plan. It encompasses potential frictions between the CEO and board members that arise as the CEO might perceive a lack of trust and a higher likelihood of being replaced, along with uncompensated stress and effort to identify and train potential successor candidates and possibly persuade them to await their turn. The second and third components capture the misalignment of incentives between the board and the shareholders regarding the decisions to fire the CEO and adopt a CEO succession plan, respectively. Motivated by the empirical evidence, all the cost parameters are expressed as fractions of a firm's book assets B_t.

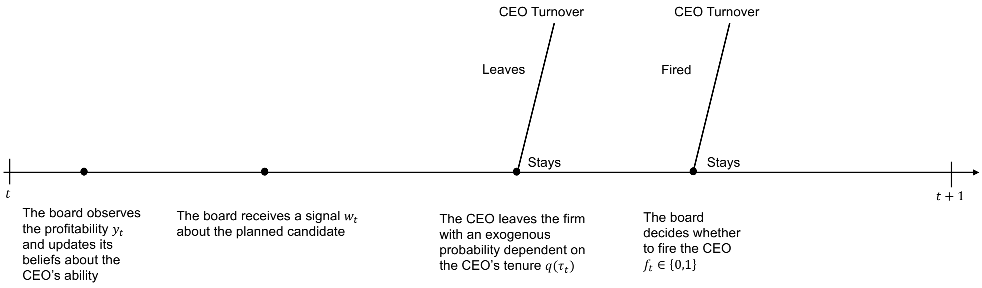
Since we assume that assets are constant and that it would be hard to separately identify the board's cost parameters, c_f^{board} and c_a^{board}, versus the degree the board internalizes the shareholder value, κ, following Taylor (2010), we re-scale the per-period utility by κB_t. In other words, we cannot distinguish between a board that strongly dislikes firing or adopting and one that disregards shareholder value due to a lack of compensation incentives, sense of responsibility, or reputation benefits. Hence, we estimate the personal costs of the board of firing and adopting as c_f^{board}/κ and c_a^{board}/κ, respectively, that is, in terms of units of board utility instead of dollars. We can interpret the magnitude of the scaled costs as a measure of the board's indifference toward shareholder profits or concern for shareholder value losses.

Finally, we allow for a common feature of discrete choice models: action-specific additively separable extreme value preference shocks that enter the board per-period utility. All sets of shocks are distributed independently across firm-CEO pairs and time. The first set, $\epsilon_{u,t}$, attaches to the decision to use the CEO succession plan and is received after a turnover occurs. The second set, $\epsilon_{f,t}$, attaches to the decision to fire the CEO. The third set, $\epsilon_{a,t}$, attaches to the decision to adopt a plan. These shocks capture events and factors outside our model, such as scandals involving the board or the CEO, health problems affecting the CEO, the CEO contemplating retirement, or pressure from shareholder activists that may influence the board's decisions. In Section 4, we specify the distributional assumptions regarding these shocks. Figure 4 illustrates the timing of the model with the shocks included.

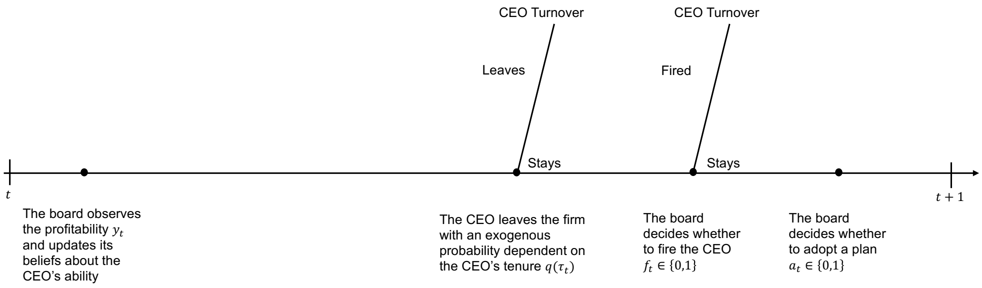
3.2 Predictions

We solve the model in five steps. We use Bayes' rule to derive the board's beliefs about CEO ability. We substitute the beliefs into the board's objective function. We obtain the Bellman equation associated with the board's problem, initially ignoring the preference shocks. We incorporate the shocks to get the expected value functions of each choice. Finally, we solve numerically the Bellman equation and generate further predictions through simulation. We delegate details about the model derivations to the Internet Appendix.

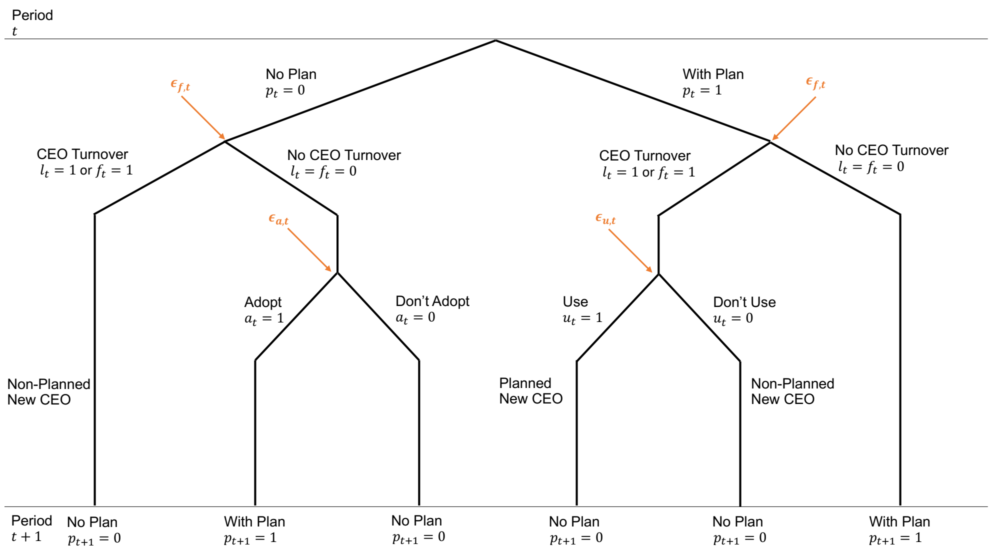
Given the paper's aim, we focus on the model's predictions about the board's decisions to use and adopt a CEO succession plan and the firing decision when there is a plan. We obtain the policy functions as choice probabilities because of the preference shocks. Since the predictions hold across a wide range of plausible parameter values and assumptions, we use



(a) Timing Within Period with Plan



(b) Timing Within Period without Plan



(c) Timing Around a Potential CEO Turnover Event

Figure 4: Timing of the Model

This figure illustrates the model timing. Panels (a) and (b) show the timing within each period with and without a plan in place, respectively. Panel (c) displays the timing around a potential CEO turnover event.

the values of Table 5 along with the assumptions outlined in Section 4.1. To our knowledge, the predictions in this section are novel and have not been tested previously.

3.2.1 The Board's Plan Usage Decision

The board decides whether to use a CEO succession plan by weighing the savings on CEO turnover costs against the information about the planned CEO candidate. On the one hand, using the plan reduces the CEO turnover losses by χc^{firm}. The greater the effectiveness of the plan strategies in reducing disruption costs χ, the larger the savings from using the plan. On the other hand, the board has a more accurate estimate of a planned candidate's ability than the non-planned candidate's. The variance of the prior beliefs about the planned candidate is $\sigma_0^2/(1+\sigma_0^2/\sigma_w^2)$, compared to σ_0^2 for a non-planned candidate. In percentage terms, the beliefs about the planned candidate are more precise by $\sigma_0^2/(\sigma_0^2+\sigma_w^2)$, which is decreasing in the initial signal volatility σ_w. However, the initial signal about the planned candidate may be unfavorable, leading to a lower mean belief about the planned candidate than that of a non-planned candidate. If the gap between mean beliefs is large enough, the board may prefer to appoint a non-planned candidate despite incurring all the turnover costs.

Panel (a) of Figure 5 illustrates the probability that the board uses a plan as a function of the planned candidate's initial perceived ability in three cases. The black solid line represents the baseline case, with the policy function derived using the aforementioned parameter values and assumptions. The light blue dashed line represents the case of large turnover cost savings, obtained by setting $\chi = 0.75$. The dark blue dotted line represents the case of a highly precise initial signal about the planned candidate, obtained by setting $\sigma_w = 0.01$.

The three policy functions exhibit the anticipated pattern: the board's likelihood of using the plan is close to zero if the planned CEO candidate is perceived as a poor fit and increases with the planned CEO candidate's initial perceived ability approaching one. A particularly good (bad) signal about the planned CEO candidate leads the board to prefer using (not using) the plan and appointing the planned (non-planned) candidate. The better the signal about the planned CEO candidate, the higher the candidate's perceived ability, and the more likely the board is to use the plan.

The case of large turnover cost savings underscores the positive impact of χ on the probability of using the plan. With a higher χ, this probability is greater than or equal to that in the baseline case at every level of the planned CEO candidate's initial perceived ability. When the plan strategies reduce monetary turnover costs more effectively, the board is more inclined to use the plan, also at lower levels of the planned candidate's initial perceived ability. The board is more likely to promote a planned candidate to save on turnover costs, even if this candidate's perceived ability is quite worse than that of a non-planned candidate.

The highly precise signal case shows that the volatility of the initial signal, σ_w, has virtually no effect on the probability of using the plan, as this probability is nearly identical to that in the baseline case. This result arises from two opposing effects. On the one hand, with a highly precise signal, the board becomes very demanding with planned candidates, setting a particularly high ability threshold for their selection. Since the board is risk-neutral, it does not place additional value on reduced uncertainty in initial beliefs about the CEO's ability. Furthermore, if we view the pools of planned and non-planned candidates as being separate, as σ_w decreases, the dispersion among planned candidates narrows, reducing the likelihood that a planned candidate will be a particularly good CEO compared to non-planned candidates. On the other hand, a highly precise signal lowers the likelihood of an immediate forced CEO turnover, since the board has a more accurate estimate of the planned candidate's ability, making it less inclined to incur turnover costs. These two effects, higher selection demand and reduced firing probability, offset each other, resulting in a probability of using the plan that remains close to the baseline case.

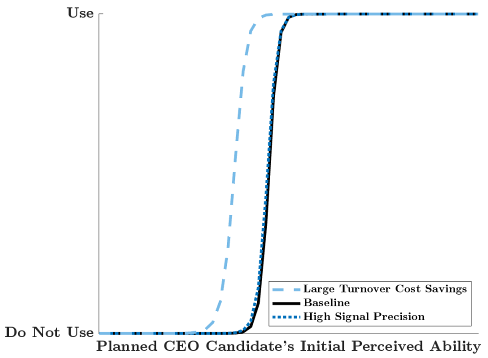
We also find that the pecuniary cost of a CEO turnover c^{firm} positively affects the propensity of the board to use the plan. If c^{firm} increases, the board is more likely to appoint a planned CEO, since using the plan allows the board to have lower losses in the event of a turnover. Furthermore, the initial uncertainty about a CEO σ_0 negatively impacts the probability of using the plan. Besides increased uncertainty, a higher σ_0 means more variation in ability across CEOs, making a non-planned CEO more attractive to the board.

3.2.2 The Board's Plan Adoption Decision

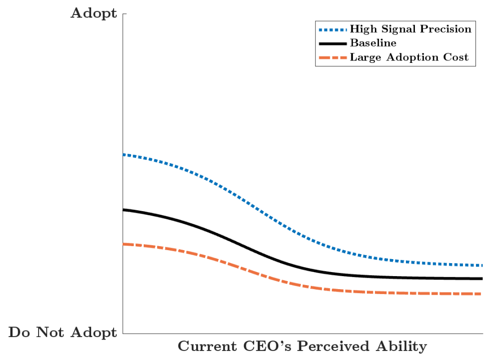
The board's decision to adopt a CEO succession plan hinges on the likelihood of a CEO turnover. A plan offers the possibility to reduce turnover losses and provide more accurate information about successors, enabling a faster recovery and a quicker learning about new CEOs. The closer a CEO's departure appears, the more valuable these benefits become. Since adopting a plan is costly to the board, its preference for having a plan grows as a turnover seems more imminent.

Panel (b) of Figure 5 shows the probability that the board adopts a plan as a function of the current CEO's perceived ability. The black solid and the dark blue dotted lines represent again the baseline and the highly precise signal, respectively. The orange dot-dashed line represents the case of a more costly plan, obtained by setting $c_a^{board}/\kappa = 5\%$.

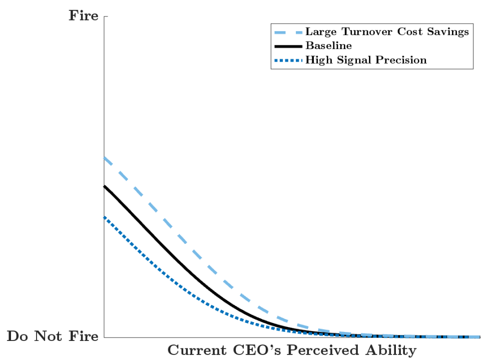
In all three cases, the probability that the board adopts a plan decreases with the current CEO's perceived ability on the left side of the figure and flattens out on the right side once the ability level is sufficiently high. When the CEO's perceived ability is low, the board is more inclined to consider succession. The lower the mean belief about the CEO, the more



(a) Use



(b) Adopt



(c) Firing with Plan

Figure 5: The Board's Policy Functions

This figure illustrates the board's policy functions. Panel (a) shows the probability that the board uses a plan as a function of the planned candidate's initial perceived ability. Panel (b) shows the probability that the board adopts a plan as a function of the current CEO's perceived ability, considering only firms without a plan and averaging across firms led by planned and non-planned CEOs and tenure levels. Panel (c) shows the probability that the board fires the current CEO as a function of the latter's perceived ability, considering only firms with a plan, averaging across firms led by planned and non-planned CEOs and tenure levels, and conditioning on the planned candidate's perceived ability being equal to that of a non-planned candidate. In each case, we use the assumptions about voluntary turnovers and preference shocks detailed in Section 4. The black solid line represents the baseline case, using the parameter values of Table 5. The dark blue dotted line represents the case of a highly precise initial signal about the planned CEO candidate, with $\sigma_w = 1\%$. The light blue dashed line represents the case of large turnover cost savings, with $\chi = 75\%$. The orange dash-dotted line represents the case of a very costly plan adoption, with $c_a^{board}/\kappa = 5\%$.

the board is inclined to change leadership and adopt a plan. As this probability is conditional on the CEO staying, the lower the CEO's perceived ability, the more likely the board is to prepare for succession. Conversely, when the CEO's perceived ability is high, directors are not interested in firing the CEO, leading to a decreased likelihood of adoption. Consequently, the probability of adoption becomes low and independent of the CEO's perceived ability.

The highly precise initial signal case highlights that the more beneficial the plan, the more likely the board is to adopt it. If a plan provides a more precise signal about the planned candidate, the probability of adoption increases independently of the current CEO's perceived ability level. Similarly, if the plan allows to save a higher fraction of turnover costs, the probability of adoption also rises. Interestingly, while a higher χ leads to a higher probability of plan usage and adoption, a lower σ_w has little effect on the likelihood of using the plan. A more precise initial signal enables the board to learn more about the planned candidate and make a more confident decision about using the plan. Since the board optimally determines the probability of using a plan, a more accurate signal helps the board avoid very bad CEOs and retain very good ones. Consequently, higher initial signal precision increases the plan's ex-ante value, prompting the board to adopt one.

The very costly plan case illustrates that the higher the scaled cost to the board of adopting a plan, the less likely the board to adopt it, no matter the current CEO's perceived ability. The other cost to the board, c_f^{board}/κ, has a milder effect on the adoption probability: the higher the board's disutility from firing, the lower the firing likelihood, and the lower the board's interest in having a plan in place. Since this cost directly affects the cost of firing but not the cost of adopting, its effect is lower than that of the other personal cost and mainly in the middle region of CEO ability, where it influences the probability of being fired the most. Vice versa, the pecuniary cost of a turnover, c^{firm}, positively impacts the adoption probability for the same reason as the usage probability.

To analyze the impact of the initial uncertainty about the CEO ability, Figure 6 plots the fraction of firms adopting a plan over four CEO tenure bins using a high and low value of the parameter σ_0. The dark blue bars represent the former case, while the light blue bars represent the latter. A high initial uncertainty implies a noisier prior estimate of the CEO's ability and more variation in ability across CEOs. As a result, the board is more inclined to fire the CEO in the early years of tenure and more likely to adopt a plan early on to be prepared for a potential succession. If σ_0 is low, learning occurs more slowly, as the board needs more time to assess whether the current CEO is better than alternative candidates. In this case, the plan has a lower value for the board. Consistent with this intuition, lowering the profitability persistence ϕ or increasing the volatility of the profitability σ_ε reduces the board's propensity to adopt a plan.

In Figure 7, we examine the model's predictions regarding CEO performance surrounding the adoption of a succession plan. The figure shows the predicted average firm excess profitability in blue and the board's mean belief about the CEO's ability in gray from 3 years before to 3 years after an adoption. The dynamics of the predicted firm performance align with the empirical evidence in Figure 3, though, as discussed in Section 4, we target only two moments related to the firm performance around adoption. The initial dip in profitability incentivizes the board to adopt a plan. Following adoption, the CEO must perform well to

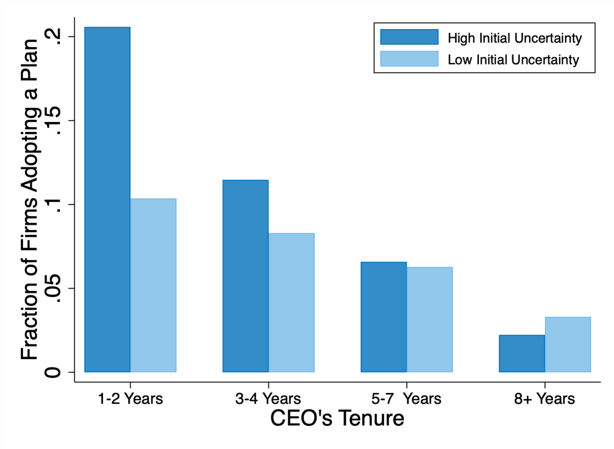


Figure 6: Predicted Board's Adoption Rate Over CEO Tenure

This figure shows the fraction of firms adopting a CEO succession plan at different CEO tenure levels. The dark (light) blue bars represent the case of high (low) initial uncertainty of the initial prior beliefs, with $\sigma_0 = 4\%$ ($\sigma_0 = 1\%$). The other parameter values used are those of Table 5. In both cases, we employ the assumptions detailed in Section 4.

retain the job. Consistent with this explantion, the mean belief drops gradually, leading up to plan adoption, and rises steadily one period afterward. This V-shaped pattern reflects the outcome that either the CEO stays and convinces the board of being the right fit, or a candidate with a higher perceived ability takes over.

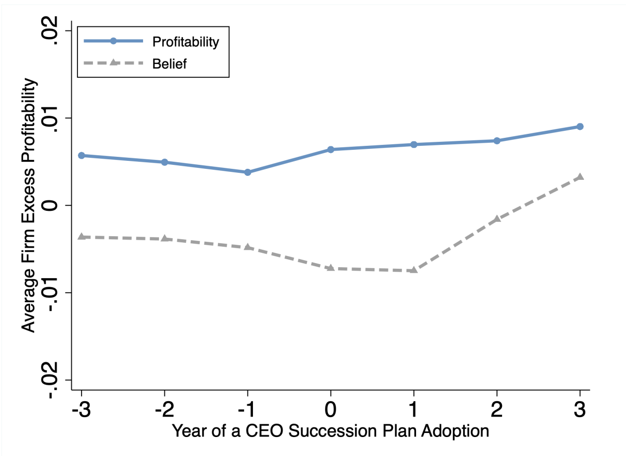


Figure 7: Predicted Performance Around CEO Succession Plan Adoptions

This figure shows predicted performance from 3 years before to 3 years after the adoption of a CEO succession plan. The blue solid line represents the average firm excess profitability. The gray dashed line represents the board's mean beliefs about the CEO's ability. We use the parameter values of Table 5 and the assumptions detailed in Section 4.

3.2.3 The Board's Firing Decision with a Plan

The board decides whether to fire the CEO by comparing the current CEO's perceived ability with that of the potential successor, whether planned or non-planned, while accounting for both pecuniary and personal turnover costs. The larger the gap between the potential successor's perceived ability and that of the current CEO, the more likely the board is to initiate a succession. When a succession plan is in place, the board weighs the option of retaining the current CEO against either hiring a non-planned candidate and incurring full turnover costs or promoting the planned candidate and reducing these costs.

Panel (c) of Figure 5 displays the probability that the board fires the current CEO as a function of the CEO's perceived ability across the three cases examined for the plan usage policy function. We consider a firm with a plan in place and a planned candidate whose perceived ability equals that of a non-planned candidate. In other words, the board's beliefs about the two candidates are the same in terms of means but differ in terms of variance, as those of the planned candidate are more precise. Increasing the planned candidate's perceived ability raises the firing likelihood, regardless of the current CEO's perceived ability.

Similar to the adoption policy function, in the left part of the graph, a lower level of the current CEO's perceived ability increases the likelihood of dismissal, irrespective of the case considered. The worse the current CEO is perceived to be, the more likely the board is to replace her. Above a certain threshold of perceived ability, the board finds it too costly to initiate a succession. Consequently, the probability of CEO dismissal becomes zero and independent of the CEO's perceived ability.

The case of large turnover cost savings highlights the positive effect of χ on the likelihood of CEO dismissal. When the plan more effectively reduces the turnover costs, the board becomes more inclined to use it, thereby increasing the propensity to fire the current CEO. A higher χ makes the board more willing to fire the CEO, as the monetary turnover losses are reduced. As a consequence, the probability of firing is higher than in the baseline case.

The case of a highly precise signal illustrates that lower uncertainty about the planned candidate reduces the probability of firing the CEO. This outcome stems from the heightened selection demand described in the board's plan usage decision. As σ_w decreases, the board becomes more selective with planned candidates, setting a higher ability threshold for selection. In this case, the board prefers to wait for a highly promising candidate, given that a succession plan is already in place. Thus, the probability of CEO dismissal decreases.

4 Structural Estimation

In this section, we begin by discussing the estimation methodology. We then describe the identification strategy. Next, we examine the estimation results and assess the model's fit on the full sample. We subsequently analyze estimation outcomes across subsamples. Finally, we present the results of the counterfactual experiments.

4.1 Estimation Methodology

Before describing the model's estimation, we discuss the data, parameters set in advance, and additional assumptions. The data used in the estimation are those described in Section 2. Based on the empirical findings and model assumptions, we construct the estimation moments categorizing CEOs in the data as planned if they were internally appointed while a plan was in place and non-planned in all other cases. We interpret one model period as a year. We set the discount factor, β, to 0.9, a standard value in the structural literature on boards, which mirrors the yearly market return in the sample. The maximum number of years a CEO serves at the firm, $\overline{\tau}$, is set to 18 years, representing the 90th percentile of CEO tenure in our sample. We derive the probabilities of a CEO leaving based on the coefficients of a logistic regression of a voluntary turnover dummy on a constant and CEO tenure.

Regarding the preference shocks, we make the following assumptions. First, in line with the approach used in the recent macroeconomics and sovereign debt literature (Dvorkin et al. (2021); Chatterjee et al. (2023)), we set the location parameters of each set of preference shocks such that they have mean zero so to avoid biases in the choices. Second, the shocks associated with the plan usage decision are uncorrelated with those associated with the firing decision. This assumption is reasonable, as the factors influencing the final choice of a new CEO typically arise after a turnover occurs. Assuming Type I extreme value distributions, this implies we estimate two scale parameters, λ_u and λ_f, for the usage and firing decision shocks, respectively, without imposing any constraint. Finally, we posit a nested logit structure for the decision problem when no plan is in place, allowing the preference shocks related to the firing and adoption decisions to be correlated. Specifically, since we assume that the adoption decision follows the firing one, we estimate the scale parameter of the distribution of the adoption decision shocks, λ_a, under the constraint $\lambda_a \leq \lambda_f$. This is equivalent to setting $\lambda_a = \rho\lambda_f$, where $\rho \in [0, 1]$ is a parameter capturing the correlation between these shocks, consistent with a nested logit structure (Train (2003)).

Using the SMM, we estimate the 12 parameters of the model: the mean of the board's prior beliefs, μ_0, the standard deviation of the board's prior beliefs, σ_0, the parameter controlling the firm-specific profitability persistence, ϕ, the standard deviation of the firm-specific profitability shocks, σ_ε, the pecuniary CEO turnover costs, c^{firm}, the scaled personal cost of firing the CEO to the board, c_f^{board}/κ, the scaled personal cost of adopting a plan to the board, c_a^{board}/κ, the standard deviation of the initial signal about the planned candidate, σ_w, the turnover cost saving effectiveness of a plan, χ, the scale parameter of the preference shocks attached to the decision of firing the CEO, λ_f, the scale parameter of the preference shocks attached to the decision of using a plan, λ_u, and the scale parameter of the preference shocks attached to the decision of adopting a plan, λ_a. The basic intuition of the SMM approach is to find the set of parameter values that minimizes the distance between a set of moments simulated from the model and their empirical counterparts in the data. We provide further details on our SMM approach in the Internet Appendix.

4.2 Identification Strategy

The success of the SMM approach relies on effective model identification, which requires selecting moments that are sensitive to variations in the parameters. Hence, it is important to discuss how the parameters depend on the moments. To help understand which features of the data identify which parameters, we compute the elasticities of the moments to the parameters and the elasticities of the parameters to the moments. To conserve space, we summarize the results here and relegate the graphs to the Internet Appendix.

In total, we use 25 moments to estimate the 12 model parameters. While some parameters affect multiple moments, certain moments are more sensitive to changes in specific parameters. The parameter capturing the persistence of firm-specific profitability, ϕ, is identified by the autocorrelation of firm-specific profitability. A higher value of ϕ implies a lower autocorrelation value. We compute the latter moment using the method of Han and Phillips (2010), which captures intercept heterogeneity. The mean of the board's prior beliefs, μ_0, is identified by the mean intercept obtained from computing the autocorrelation. Since μ_0 controls the average ability of the CEOs, a higher value of μ_0 implies a higher average impact of CEOs on firm profitability, leading to a higher mean intercept. The standard deviation of the firm-specific profitability shock, σ_ε, is identified by the variance of the residuals obtained from computing the autocorrelation. A higher value of σ_ε results in a greater dispersion of the residuals. Following Taylor (2010), to identify σ_ε and the standard deviation of the board's prior beliefs, σ_0, we employ two additional moments, the mean of the CEO-specific variances of persistence-adjusted firm-specific profitability and the variance of the CEO-specific means of persistence-adjusted firm-specific profitability. The first moment is most informative about σ_ε because it removes the effects of each CEO's ability. The second moment is most informative about σ_0. Since σ_0 controls the dispersion of the ability of the CEOs, σ_0 is identified by this moment, which measures the dispersion of a proxy for ability, namely, the CEO's average realized profitability.

The parameter capturing the pecuniary costs associated with a CEO turnover, c^{firm}, is identified by the mean firm-specific profitability in the year of a forced CEO turnover. A higher value of c^{firm} implies worse performance when a CEO is fired. The scaled personal cost to the board of firing the CEO, c_f^{board}/κ, is identified by the forced CEO turnover rate. A higher value of c_f^{board}/κ implies a greater disutility to the board from dismissing a CEO, resulting in a lower fraction of fired CEOs. However, the scale parameter of the shocks attached to the firing decision, λ_f, has the opposite effect: a higher value of λ_f pushes the probability of firing the CEO toward one-half due to the properties of preference shocks. Hence, we rely on six additional moments to separately identify c_f^{board}/κ and λ_f. The first moment is the coefficient from a regression of a dummy variable indicating a forced CEO turnover on lagged firm-specific profitability. A higher value of c_f^{board}/κ implies a higher value of this coefficient, as a greater personal cost of firing the CEO reduces the influence of performance in the decision to fire. Consequently, this negative coefficient converges to zero as c_f^{board}/κ increases. In contrast, a higher value of λ_f implies a lower value of this coefficient, as a larger scale implies a greater propensity to fire the CEO as soon as performance declines, causing this coefficient to decline. The other five moments are the means of the firm-specific profitability from two years before to two years after a forced CEO turnover. A higher value of c_f^{board}/κ implies a greater reluctance to fire a CEO, causing lower performance around a forced turnover. Conversely, a higher value of λ_f raises the probability of firing, increasing the mean firm-specific profitability during the time window of a firing event. In other words, a higher value of c_f^{board}/κ accentuates the V-shaped pattern of the mean firm excess profitability around a forced CEO turnover, whereas a higher value of λ_f flattens it.

To identify the scaled personal cost to the board of adopting a plan, c_a^{board}/κ and the scale parameter of the shocks attached to the adoption decision, λ_a, we use a similar strategy as the one used for c_f^{board}/κ and λ_f. The first parameter, c_a^{board}/κ, is identified by the plan adoption rate, since a higher value of c_a^{board}/κ implies a lower plan adoption frequency. However, λ_a positively affects this moment. A higher value of λ_a leads to the probability of plan adoption converging to one-half, thereby increasing the adoption rate. Therefore, we use two additional moments to separately identify c_a^{board}/κ and λ_a. The first moment is the coefficient from a regression of a dummy variable indicating a plan adoption on lagged firm-specific profitability, while the second moment is the mean firm-specific profitability in the adoption year. Similar to the parameters related to the firing decision, the coefficient is positively affected by c_a^{board}/κ and negatively by λ_a, whereas the mean is negatively affected by c_a^{board}/κ and positively by λ_a.

Two points are worth noting. First, the coefficient of the firing dummy on lagged firm-specific profitability is more sensitive to c_f^{board}/κ than to c_a^{board}/κ, while the coefficient of the adoption dummy on lagged firms-specific profitability is more sensitive to c_a^{board}/κ than to c_f^{board}/κ. Second, both c_f^{board}/κ and c_a^{board}/κ negatively impact the mean firm-specific profitability around a firing event, but c_f^{board}/κ has a tiny positive effect on the mean firm-specific profitability in the year of an adoption. The differences in the sensitivity of the coefficients and the mean performance in the adoption year help to separately identify the two personal cost parameters.

The standard deviation of the initial signal about the planned candidate, σ_w, is identified by the mean firm-specific profitability two years before, one year before, and in the year of a forced turnover of a planned CEO. A lower value of σ_w implies a more precise signal, providing more accurate information about the planned candidate and increasing the board's readiness to replace the CEO without waiting for a significant performance decline. In other words, with a more accurate signal, the board relies less on profitability to make its decisions. The turnover cost saving effectiveness, χ, is identified by the mean change in firm-specific profitability in the year of a forced turnover if the board uses the plan. A higher value of χ implies lower monetary turnover losses when a plan is used and a lower profitability change in the firing year. The scale parameter of the shocks attached to the plan usage decision, λ_u, is identified by the usage rate. Due to the properties of preference shocks, a higher value of λ_u results in a lower usage rate, as this moment exceeds 50%.

To separately identify the three scale parameters, we use five additional moments, namely, the means of firm-specific profitability from two years before to two years after a forced CEO turnover with a plan in place. Along with the five means of firm-specific profitability around a forced CEO turnover that do not condition on whether a plan is in place, these moments are useful to identify λ_f, λ_a, and λ_u. Up to a forced CEO turnover, increasing the value of either λ_f or λ_a has a similar positive effect on the mean firm-specific profitability. However, when we consider the mean moments up to a forced CEO turnover with a plan, increasing the value of λ_f has a significantly larger effect on mean firm-specific profitability than λ_a. Intuitively, if a firm already has a plan, λ_a has a lower impact on performance than λ_f. On the other hand, after a forced CEO turnover, increasing the value of λ_a has a significantly larger effect on mean firm-specific profitability than λ_f. A higher value of λ_a increases the likelihood of plan adoption, thereby increasing the chances of reducing turnover losses. In contrast, a higher value λ_f increases the likelihood of firing at a higher level of profitability but does not impact the probability that the board can reduce the CEO turnover losses. Finally, a higher value of the scale parameter of the shocks attached to the plan usage decision, λ_u, implies a lower mean firm-specific profitability around a forced CEO turnover, with this effect being stronger when there is a plan. Intuitively, a higher value of λ_u implies a lower probability that the plan is used, which reduces the board's likelihood of saving on CEO turnover costs and selecting the candidate with the highest perceived ability, causing the board to prefer to wait longer before firing the CEO. Table B.2 summarizes the identification strategy.

4.3 Estimation Results on the Full Sample

Table 5 presents the results from the SMM estimation of the model on the full sample. Panel A reports the empirical and simulated moments, and the t-statistics for the differences between the corresponding moments. In economic terms, the simulated moments from the estimated model closely match the empirical moments. Overall, the model matches the data very well, with 18 t-statistics out of 25 indicating nonsignificance. The performance of the model's fit is also confirmed in Figure 8, where we present empirical and predicted patterns in firm-specific profitability and plan adoptions to show the model's fit. The first seven panels of the figure show that the predicted and the empirical performances are close, reproducing the stylized facts of Section 2, which we do not fully target in the estimation.

The model matches other untargeted empirical patterns very well. For instance, the predicted average firm-specific profitability of firms led by planned (non-planned) CEOs is 1.6% (0.6%), while the empirical counterpart is 1.7% (0.7%). We obtain this result without assuming different mean abilities between planned and non-planned CEOs. The model also produces a positive correlation between the probability of using a plan and firm-specific profitability. A body of work (Parrino (1997); Huson et al. (2001); Fee and Hadlock (2003); Cziraki and Jenter (2022)) document that better-performing firms are more likely to promote internally. The typical explanation for this phenomenon is that boards prefer maintaining continuity when a firm performs well. Otherwise, boards prefer to hire an outsider to bring a change. In our model, this result emerges without assuming a board preference for stability. If the board receives a particularly promising signal about a planned candidate, the directors are more likely to initiate succession while performance is relatively high.

There are three aspects of the data where the model's fit is more modest. First, the predicted plan adoption rate and mean firm-specific profitability are lower than their empirical counterparts. A potential reason for this discrepancy is the absence of an additional signal beyond profitability from which the board can learn about the CEO's ability in the model. Cornelli et al. (2013) empirically document that boards use signals besides profitability when learning about CEO ability, and Taylor (2010) and Taylor (2013) show that incorporating an additional signal can improve the fit of learning models like ours to certain data features. This lack is also confirmed in the last panel of Figure 8, which examines the adoption rate pattern by plotting the percentage of firms adopting a succession plan over CEO tenure. The predicted adoption rate in the first two years of a CEO's tenure is lower than the empirical one. This discrepancy explains the predicted plan adoption rate moment in Table 5. While we do not target these moments in the structural estimation, learning appears to occur too slowly in the model. Indeed, although they are not statistically different, the average number of years after which a CEO is fired in the model is 8.96, while 6.08 in the data. Second, the model has difficulties matching the profitability after a forced CEO turnover. This limitation may be because the model does not allow periods when the firm is without a CEO. Rivolta (2018) and Gabarro et al. (2023) document that firms can experience delays in successions. Finally, the model does not produce a large enough gap between the profitability of (i) firms without a plan and firms with a plan with non-planned candidate successors and (ii) firms led by CEOs who were planned candidates and firms led by CEOs who were non-planned candidates. An extension to capture these differences would be to assume that also boards of firms without a plan receive a signal about insider candidates that is less precise than that observed by boards with a plan. Nonetheless, since our model reproduces the key features of the data very closely, we leave these extensions out for parsimony.

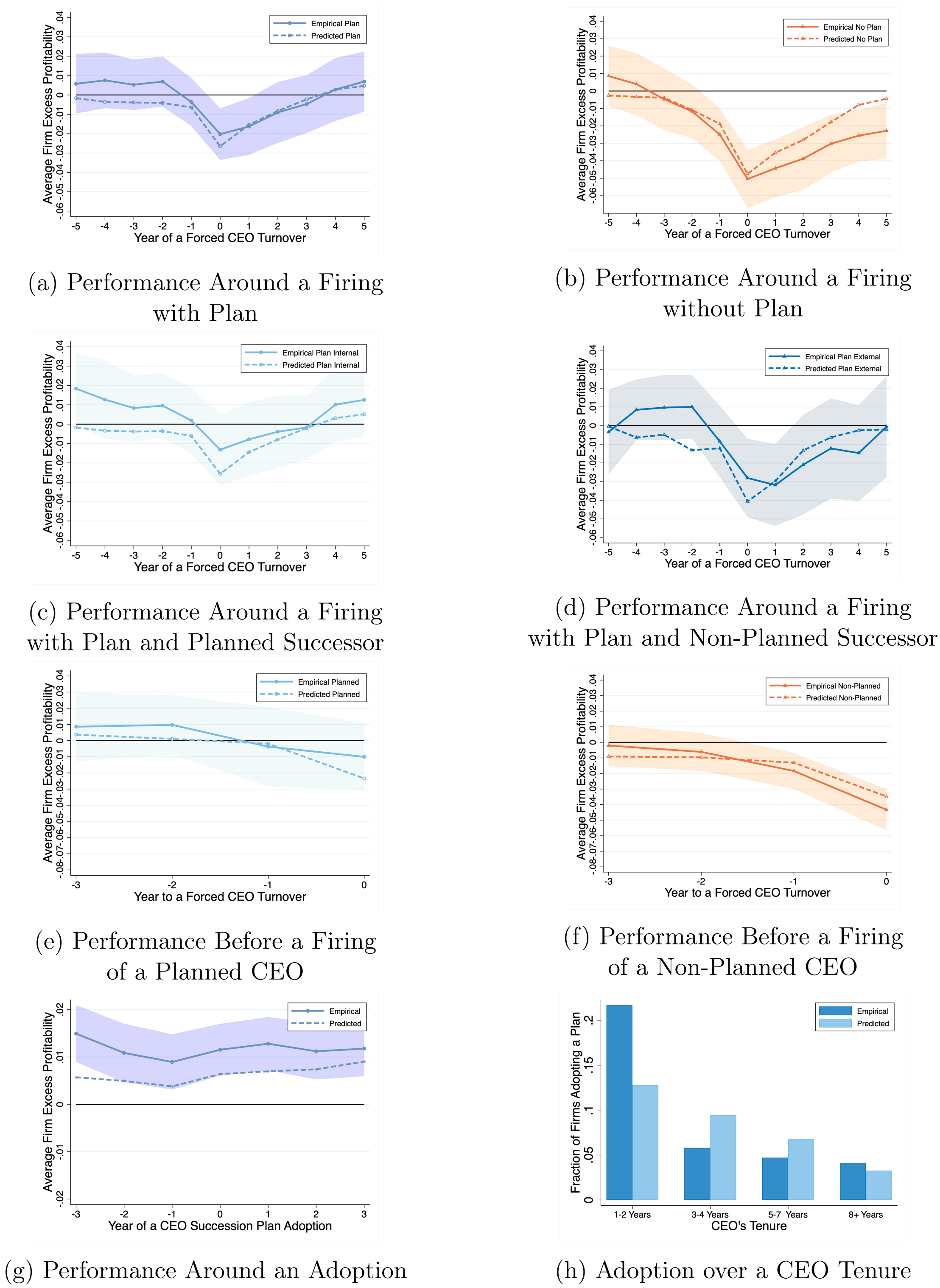
Panel B reports the model parameter estimates with their standard errors in parentheses. The estimated CEO turnover cost to the firm, c^{firm}, is 2.57% of the assets, corresponding to \$55 million for the median firm in our sample. This estimate is reasonable based on anecdotal evidence and findings in the empirical literature (Yermack (2006)). The estimated personal cost of firing the CEO to the board, c_f^{board}, is 6.11% of the assets, which corresponds to \$132 million for the median firm. Since this cost is in units of board utility, the board behaves as if firing the CEO costs shareholders $c^{firm} + c_f^{board} = 8.7\%$ of the firm's assets, or \$187 million. The estimated personal firing cost is higher in percentage terms (though not in dollar terms) than the estimates found in previous works (Taylor (2010)). One reason for this gap is that we are the first to account for the potential presence of a CEO succession plan in our model. To fit the low empirical CEO firing rate despite a fraction of firms having a plan that may reduce turnover costs, the estimated personal firing cost must be particularly high.

The estimated personal cost of adopting a CEO succession plan to the board, c_a^{board}, is 3.93% of the assets, corresponding to \$84 million to the median firm. Since this personal cost is also expressed in units of board utility, we can interpret its magnitude in terms of an indifference relation with shareholder profits. In other words, the board behaves as if adopting a plan would cost shareholders \$84 million. This finding unveils a large misalignment of incentives between shareholders and the board regarding this decision. Our estimates indicate that having a plan offers two potential substantive benefits. The estimated standard deviation of the initial signal about the planned candidate, σ_w, is 4.07%, implying that the board's estimate of a planned candidate's ability is $\sigma_0^2/(\sigma_0^2+\sigma_w^2) = 25\%$ more accurate than that of a non-planned candidate. The process of outlining a plan, training, and interviewing potential CEO candidates provides the board with a significant amount of additional information about potential successors. The estimated turnover cost saving effectiveness, χ, is 32.54%, indicating that a firm can save nearly a third of its turnover losses if the board adheres to the strategies outlined in the plan. In Section 4.5, we provide a monetary quantification of these two benefits. Finally, our estimates of the scale parameters of the shocks attached to the firing and adoption decisions, λ_f and λ_a, imply a high correlation of $\lambda_a/\lambda_f = 55\%$ between the shocks attached to these two decisions when no plan is in place. The rest of our estimates are reasonable and align with the findings of the existing literature.

4.4 Estimation Results Across Subsamples

In this section, we present and analyze the results from estimating the model on different subsamples. Table 6 reports the parameter estimates and their standard errors obtained from the estimations on various subsamples. We consider six sample splits based on firm size (measured by book assets), board size (measured by the number of directors), number of independent directors, institutional ownership, and the SEC policy shift of 2009. For all splits except the last one, we categorize firms into one of two groups based on whether they were above the sample median for a given attribute in at least two-thirds of their sample years. This approach helps prevent firms from frequently switching categories, which could bias the results. For the last split, we divide the sample into two periods, 2001–2009 and 2009–2018. We exclude observations from 1998 to 2000 to balance the length of the two periods and to minimize potential biases from the initial years of the sample, as plan disclosures began in 1998. The intent of these exercises is twofold: to study subsample heterogeneity and to determine how our estimates relate to standard governance measures. The analysis of the last sample split also allows us to examine the impact of the SEC policy shift of 2009.

The estimation results obtained from splitting firms by their size reveal that large firms have a higher estimate of c_f^{board} compared to small firms, indicating a greater misalignment of incentives regarding the firing decision. However, large firms show a significantly lower estimate of c_a^{board}, suggesting a smaller misalignment of incentives related to the adoption decision. Additionally, boards of large firms not only incur a lower personal cost from adopting plans but also appear to implement more effective plans. Estimates of σ_0 and σ_w indicate that large firms' assessments of planned candidates' abilities are 38% more accurate than those of non-planned candidates, compared to 18% for small firms. When used, plans at large firms reduce turnover losses much more effectively, with their estimate of χ being almost



(a) Performance Around a Firing with Plan

(b) Performance Around a Firing without Plan

(c) Performance Around a Firing with Plan and Planned Successor

(d) Performance Around a Firing with Plan and Non-Planned Successor

(e) Performance Before a Firing of a Planned CEO

(f) Performance Before a Firing of a Non-Planned CEO

(g) Performance Around an Adoption

(h) Adoption over a CEO Tenure

Figure 8: Empirical and Predicted Patterns

This figure presents empirical and predicted patterns in firm-specific profitability and plan adoptions. Panels (a)-(d) show the average firm-excess profitability around a firing. Panels (e) and (f) show the average firm-excess profitability before a firing. Panel (g) shows the average firm-excess profitability around an adoption. Solid lines indicate empirical patterns. Dashed lines indicate predicted patterns. The shaded areas represent the 99% confidence intervals. Panel (h) shows the fraction of firms adopting a plan at different CEO tenure levels. The predicted patterns are obtained by solving and simulating the model using the parameter values of Table 5 and the assumptions described in this Section.

Table 5: SMM Estimation on the Full Sample

This table reports the results from the SMM estimation of our model on the full sample. Panel A reports the empirical and simulated moments, as well as the t-statistics for the differences between the corresponding moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

Moment	Data	Model	t-stat
Autocorrelation of Profitability	0.7878	0.7838	0.1346
Mean Intercept	0.0014	0.0014	0.0087
Variance of Residuals	0.0033	0.0036	-1.8459
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0191	0.0192	-0.0454
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.0853	0.0890	-0.7436
Forced Turnover Rate	0.0289	0.0290	-0.2340
Plan Adoption Rate	0.0835	0.0746	6.9625
Plan Usage Rate	0.7955	0.7957	-0.3049
Mean Profitability 2 Years Before a Forced Turnover	-0.0038	-0.0053	0.3931
Mean Profitability 1 Year Before a Forced Turnover	-0.0165	-0.0085	-2.0377
Mean Profitability in the Year of a Forced Turnover	-0.0393	-0.0302	-1.8416
Mean Profitability 1 Year After a Forced Turnover	-0.0340	-0.0188	-3.4485
Mean Profitability 2 Years After a Forced Turnover	-0.0281	-0.0116	-3.7654
Mean Profitability 2 Years Before a Forced Turnover with a Plan	0.0069	-0.0042	2.5683
Mean Profitability 1 Year Before a Forced Turnover with a Plan	-0.0037	-0.0064	0.6076
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0202	-0.0266	1.1677
Mean Profitability 1 Year After a Forced Turnover with a Plan	-0.0163	-0.0154	-0.1716
Mean Profitability 2 Years After a Forced Turnover with a Plan	-0.0090	-0.0083	-0.1472
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0097	0.0010	1.4293
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	-0.0038	-0.0019	-0.2100
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0100	-0.0235	1.5997
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0151	-0.0191	1.0729
Mean Profitability in the Year of a Plan Adoption	0.0115	0.0064	2.3189
Coefficient of Forced Turnover on Lagged Profitability	-0.0578	-0.0530	-0.8361
Coefficient of Plan Adoption on Lagged Profitability	-0.0439	-0.0513	4.0641

Panel B: Parameters

μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
0.0179	0.0238	0.2285	0.0647	0.0257	0.0611	0.0393	0.0407	0.3254	0.0330	0.0059	0.0182
(0.0021)	(0.0006)	(0.0037)	(0.0010)	(0.0026)	(0.0088)	(0.0014)	(0.0024)	(0.0568)	(0.0009)	(0.0011)	(0.0023)

2.5 times that of small firms. These findings suggest that large firms manage succession planning more efficiently than small firms, despite their directors' higher reluctance to dismiss CEOs. One potential explanation for this result is that directors of large firms face a greater reputational risk than those at small firms. Consequently, they may be less willing to initiate succession but strive to handle it in the most effective way possible when necessary.

Firms with large boards exhibit lower personal costs associated with firing, c_f^{board}, and adopting, c_a^{board}, and they seem to manage succession planning more efficiently. Large boards appear to gather substantially more information about planned candidates, as their estimates of σ_0 and σ_w indicate 59% greater accuracy in assessing planned candidates' ability compared to 41% for small boards. Additionally, the plans of large boards are significantly more effective at reducing turnover costs, with their estimate of χ being more than double that of small boards. These results suggest that a higher number of directors contributes positively to the succession planning process. Large boards enhance governance by involving more directors in succession planning, developing strategies to minimize turnover disruptions, and carefully selecting candidates. When examining subsamples based on the number of independent directors, the results indicate that firms with many independent directors face lower conflicts of interest regarding firing and adopting than firms with few independent directors. However, having a high number of independent directors does not appear to be related to having more efficient succession plans. According to our estimate, the turnover cost saving effectiveness of plans implemented by boards with few and many independent directors appear similar. Furthermore, boards with few independent directors seem better at screening planned successors, as their assessments of planned candidates are 38% more accurate than those of non-planned candidates, compared to 32% for boards with many independent directors. Overall, these findings show that having more directors on the board supports effective succession handling, regardless of the board's composition.

The estimates from our model on firms with high institutional investors' ownership indicate that their boards have a smaller misalignment of incentives regarding both the firing and adoption decisions compared to firms with low institutional ownership. Furthermore, firms with high institutional ownership gather substantially more accurate information about planned candidates than firms with low institutional ownership. The estimates of σ_0 and σ_w indicate that high institutional ownership firms' information is 67% more accurate versus 27% for low institutional ownership firms. Conversely, the estimates of χ in the two subsamples suggest that both types of firms save a similar fraction of turnover losses when their plans are used. Overall, this analysis suggests that high institutional ownership improves boards' alignment, and encourages directors to carefully select planned successors, although it does not enhance the turnover cost saving effectiveness of plans.

Finally, the estimation results comparing the time periods before and after the SEC mandated the disclosure of CEO succession plans and recommended their adoption suggest that the SEC's policy shift had positive effects. Not only the estimate of the cost of adoption in the later period is less than half of that in the earlier period, but the accuracy of the information about planned candidates, measured by $\sigma_0^2/(\sigma_0^2 + \sigma_w^2)$, improves by as much as 50%. Additionally, the estimate of turnover cost saving effectiveness, χ, after the 2009 SEC policy shift is nearly 10 percentage points higher than before. These findings indicate that the SEC's policy was effective not only in encouraging boards to disclose the adoption of CEO succession plans but also in promoting the development of high quality plans. Nonetheless, as of the final year in our sample, almost 40% of firms still do not disclose having a CEO succession plan. Therefore, in the next section, we explore the potential impact of a policy reform mandating all firms to have a CEO succession plan.

Table 6: SMM Parameter Estimates Across Subsamples

This table reports the parameter estimates with standard errors in parentheses from the estimation of our model across different subsamples. In the Internet Appendix, we report the full estimation results, including empirical and simulated moments, and the t-statistics for the differences between the corresponding moments.

μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
Firm Size											
Large Firms											
0.0141	0.0168	0.2028	0.0398	0.0204	0.0625	0.0272	0.0215	0.6823	0.0248	0.0287	0.0003
(0.0027)	(0.0002)	(0.0092)	(0.0013)	(0.0011)	(0.0050)	(0.0015)	(0.0034)	(0.0282)	(0.0041)	(0.0051)	(0.0001)
Small Firms											
0.0138	0.0265	0.1795	0.0798	0.0206	0.0515	0.0476	0.0573	0.2820	0.0317	0.0189	0.0209
(0.0039)	(0.0019)	(0.0151)	(0.0016)	(0.0017)	(0.0120)	(0.0072)	(0.0088)	(0.0240)	(0.0027)	(0.0044)	(0.0035)
Board Size											
Large Boards Firms											
0.0233	0.0289	0.1348	0.0385	0.0322	0.0456	0.0396	0.0240	0.5227	0.0170	0.0356	0.0013
(0.0035)	(0.0008)	(0.0076)	(0.0015)	(0.0017)	(0.0087)	(0.0034)	(0.0017)	(0.0543)	(0.0023)	(0.0032)	(0.0007)
Small Board Firms											
0.0191	0.0256	0.2570	0.0706	0.0377	0.0482	0.0471	0.0305	0.2473	0.0309	0.0282	0.0194
(0.0048)	(0.0017)	(0.0113)	(0.0017)	(0.0047)	(0.0070)	(0.0113)	(0.0026)	(0.0337)	(0.0023)	(0.0027)	(0.0054)
Number of Independent Directors											
Firms with Many Independents											
0.0296	0.0195	0.1070	0.0384	0.0218	0.0270	0.0310	0.0287	0.4440	0.0214	0.0299	0.0172
(0.0022)	(0.0019)	(0.0046)	(0.0013)	(0.0015)	(0.0027)	(0.0036)	(0.0041)	(0.0452)	(0.0008)	(0.0135)	(0.0023)
Firms with Few Independents											
0.0150	0.0203	0.2689	0.0703	0.0275	0.0529	0.0436	0.0257	0.4372	0.0241	0.0392	0.0160
(0.0024)	(0.0019)	(0.0067)	(0.0016)	(0.0034)	(0.0057)	(0.0036)	(0.0029)	(0.0386)	(0.0024)	(0.0056)	(0.0019)
Institutional Ownership											
High Institutional Ownership Firms											
0.0236	0.0335	0.1472	0.0532	0.0244	0.0398	0.0405	0.0233	0.3745	0.0090	0.0111	0.0077
(0.0024)	(0.0019)	(0.0151)	(0.0013)	(0.0027)	(0.0054)	(0.0030)	(0.0017)	(0.0398)	(0.0019)	(0.0026)	(0.0007)
Low Institutional Ownership Firms											
0.0056	0.0226	0.2652	0.0656	0.0303	0.0732	0.0628	0.0369	0.3922	0.0355	0.0034	0.0334
(0.0024)	(0.0015)	(0.0094)	(0.0016)	(0.0033)	(0.0127)	(0.0044)	(0.0027)	(0.0666)	(0.0032)	(0.0037)	(0.0033)
SEC Policy Shift											
Before the SEC Policy Shift											
0.0081	0.0311	0.1800	0.0587	0.0257	0.0574	0.0400	0.0409	0.3283	0.0312	0.0049	0.0154
(0.0036)	(0.0035)	(0.0107)	(0.0013)	(0.0037)	(0.0078)	(0.0063)	(0.0081)	(0.0604)	(0.0042)	(0.0034)	(0.0028)
After the SEC Policy Shift											
0.0153	0.0266	0.2158	0.0588	0.0270	0.0735	0.0182	0.0239	0.4203	0.0186	0.0166	0.0187
(0.0028)	(0.0016)	(0.0059)	(0.0014)	(0.0029)	(0.0117)	(0.0038)	(0.0022)	(0.0935)	(0.0030)	(0.0051)	(0.0031)

4.5 Counterfactual Experiments

In this section, we analyze the results of two sets of counterfactual experiments. The first set examines the importance of succession plan benefits and the impact of uncertainty regarding the CEO departure timing on boards' decisions and shareholder value. The second set explores the effects of two potential policy reforms, one mandating that boards have a plan in place at all times and another requiring both an ongoing plan and internal candidates' appointments. We include the second reform because, while stringent, it would provide regulators with a straightforward tool to induce boards to prioritize succession planning.

Table 7 presents the results of counterfactual experiments evaluating the benefits of CEO succession plans. Column (1) shows the fraction of fired CEOs, column (2) the fraction of firms adopting a CEO succession plan, column (3) the fraction of plans used, and column (4) the shareholder value. The first row provides the results for the baseline scenario, obtained by using the parameter values in Table 5 and the assumptions outlined in Section 4.1. The second row presents the results for a scenario with no learning benefit, where the informativeness of the additional signal about planned candidates is set to zero. The third row shows the results for a scenario with no turnover cost saving benefit, where the turnover cost saving effectiveness parameter, χ, is set to zero. The fourth row examines a scenario with no uncertainty about CEO leaving, where CEOs leave only after $\overline{\tau}$ periods. The fifth row considers a scenario without both learning benefit and leaving uncertainty, and the sixth row a scenario without both turnover cost saving benefit and leaving uncertainty.

Comparing the second and third rows, we observe that the two benefits similarly affect the adoption rate. The adoption rate drops to 6.5% without learning benefit, while it decreases to 6.2% without the saving benefit. A similar pattern appears when comparing the adoption rates in the fifth and sixth rows. Both benefits strongly impact shareholder value, but the learning benefit has a more substantial effect on shareholder value than the saving benefit. This outcome occurs because, while the absence of the saving benefit means the board no longer saves on turnover costs, the absence of the learning benefit prevents the board from quickly distinguishing between good and bad CEOs. As a result, the board takes longer to assess a CEO's fit without such benefit. Moreover, even though the board consistently uses the plan without the learning benefit, as internal and outsider candidates are perceived similarly and using a plan reduces turnover losses, the learning benefit offers a distinct advantage, enabling boards to make better informed decisions. This finding is supported by the fifth and sixth rows, where shareholder value is lower without the learning benefit and leaving uncertainty than it is without the saving benefit and leaving uncertainty.

In the no leaving uncertainty scenario, where CEOs leave deterministically, the adoption rate falls similarly to when we eliminate the plan benefits. This result suggests that the uncertainty of a CEO's departure plays a role in the adoption decision that is as significant as the two plan benefits. However, in this scenario, the shareholder value increases because the board incurs turnover costs less frequently and has the opportunity to retain a CEO perceived to be particularly good for the maximum number of periods.

Table 7: Effects of Plan Benefits

This table presents results from counterfactual experiments evaluating the benefits of CEO succession plans. Column (1) shows the fraction of fired CEOs, column (2) the fraction of firms adopting a plan, column (3) the fraction of plans used, and column (4) the shareholder value, computed as the net present value of profits. The first row shows the results in the baseline scenario, where we use the parameter values from Table 5 and the assumptions outlined in Section 4.1. The second row shows the results in the scenario without plan learning benefit, where we set the informativeness of the additional signal about planned candidates to zero. The third row shows the results in the scenario without plan turnover cost saving benefit, where we set $\chi = 0$. The fourth row shows the results in the scenario without leaving uncertainty, where we assume that the CEOs leave deterministically only after $\overline{\tau}$ periods. The fifth and sixth rows combine the conditions of the second and fourth rows and the third and fourth rows, respectively. Percentage changes from the baseline scenario are reported in parentheses.

	Fraction Fired CEOs (1)	Fraction Firms Adopting (2)	Fraction Used Plans (3)	Shareholder Value (4)
Baseline	0.029	0.075	0.796	24.249
No Learning Benefit	0.023	0.065	0.991	23.383
	(-19.4)	(-13.1)	(24.5)	(-3.6)
No Saving Benefit	0.022	0.062	0.578	23.748
	(-23.4)	(-16.6)	(-27.4)	(-2.1)
No Leaving Uncertainty	0.040	0.063	0.843	26.780
	(37.9)	(-16.0)	(5.9)	(10.4)
No Learning Benefit and	0.037	0.053	0.990	24.524
No Leaving Uncertainty	(26.9)	(-28.8)	(24.5)	(1.1)
No Saving Benefit and	0.035	0.057	0.697	26.166
No Leaving Uncertainty	(19.0)	(-23.6)	(-12.4)	(7.9)

Table 8 presents the results of counterfactuals examining two potential reforms related to CEO succession plans. The outcomes in each column are the same as those reported in the previous table. We assess the impact of these reforms across five scenarios: a baseline scenario; a scenario in which the firm always hires a CEO with an ability two standard deviations below the CEO talent pool mean; a scenario in which the firm always hires a CEO with an ability two standard deviations above the CEO talent pool mean; a scenario in which the probability of a CEO leaving is twice as high as perceived by the board; and a scenario in which the probability of a CEO leaving is half as high as perceived by the board.

In the baseline scenario, both reforms have a substantial impact: mandating that a board always has a succession plan increases shareholder value by 3.1%, while mandating both an ongoing plan and internal succession yields a 2.7% gain. Having a plan in place at all times enhances the board's readiness to replace CEOs while consistently providing the opportunity to save on CEO turnover costs and obtain a more accurate assessment of internal candidates.

Overall, this reform boosts firm performance, and thus shareholder value, by ensuring the board is constantly prepared for succession, allowing it to mitigate turnover losses and learn more rapidly about successors' ability. In contrast, mandating both an ongoing plan and exclusively internal succession has a dwarfed effect. Although turnover losses are consistently reduced, the board may lack an ideal internal successor. Consequently, preventing the board from considering external candidates can hinder shareholder value.

When we evaluate the impact of the reforms in the bad and good CEO scenarios, we find that the reforms have a stronger effect in the bad CEO scenario than in the good CEO scenario. This suggests that firms with poor leadership have a greater need for a CEO succession plan. This comparison highlights that CEO succession plans are especially vital for firms struggling to secure effective leadership. Analogously, the impact of the proposed policy changes is more pronounced when the board underestimates the likelihood of a CEO's departure than when it overestimates it. These findings underscore the importance of such reforms, particularly for firms facing a higher risk of sudden and abrupt CEO departures.

5 Conclusion

This paper provides new evidence about CEO succession plans. First, they reduce the financial losses associated with CEO turnovers, particularly when an insider is appointed. Second, they improve the evaluation of CEO successors, chiefly of internal appointees. Third, they do not impose significant costs on firms at adoption or while in effect.

Building on these findings, we develop a dynamic learning model featuring costly CEO turnover and plan adoption decisions, where plans allow the opportunity to save on CEO turnover costs and gain more precise assessments of new CEOs. We structurally estimate the model, finding that plans offer substantial benefits, but a significant personal cost to the board related to the adoption decision is needed to rationalize the observed adoption rate.

Estimating the model on various subsamples reveals that large firms, firms with large boards, and firms with high institutional ownership manage succession planning more efficiently. We also find that the policy shift of the SEC in 2009 had a positive impact: directors have been more inclined to adopt succession plans while working harder to improve internal candidates' selection and minimize disruption losses due to turnovers.

Counterfactual experiments examining the benefits of succession plans indicate that both learning more rapidly about successors and saving on turnover costs play equally substantive roles in the adoption decision. However, the learning benefit has a more significant positive impact on shareholder value. Policy counterfactuals indicate that mandating CEO succession plans would have significant positive effects, and even a reform mandating both ongoing

Table 8: Effects of Policy Reforms

This table presents results from counterfactual experiments evaluating policy reforms related to CEO succession plans. Column (1) shows the fraction of fired CEOs, column (2) the fraction of firms adopting a plan, column (3) the fraction of plans used, and column (4) the shareholder value, computed as the net present value of profits. The table is divided into five sections. The first section examines the impact of reforms mandating a plan and mandating both an ongoing plan and internal succession in the baseline scenario, using the parameter values from Table 5 and the assumptions in Section 4.1. Percentage changes from the baseline scenario without reforms are reported in parentheses. The second section assesses these reforms in a scenario where firms are always matched with bad CEOs, those with ability two standard deviations below the CEO talent pool mean. Percentage changes from this bad CEOs scenario without reforms are reported in parentheses. The third section assesses these reforms in a scenario where firms are always matched with good CEOs, those with ability two standard deviations above the CEO talent pool mean. Percentage changes from this good CEOs scenario without reforms are reported in parentheses. The fourth section assesses these reforms in a scenario where the actual probabilities that a CEO leaves are twice as high as those perceived by the board. Percentage changes from this higher leaving probability scenario without reforms are reported in parentheses. The fifth section assesses these reforms in a scenario where the actual probabilities that a CEO leaves are half as high as those perceived by the board. Percentage changes from this lower leaving probability scenario without reforms are reported in parentheses.

	Fraction Fired CEOs (1)	Fraction Firms Adopting (2)	Fraction Used Plans (3)	Shareholder Value (4)
Baseline	0.029	0.075	0.796	24.249
with Mandatory Plan	0.042	0.000	0.819	25.007
	(45.9)	(-100.0)	(3.0)	(3.1)
with Mandatory Plan and Use	0.049	0.000	1.000	24.904
	(68.0)	(-100.0)	(25.7)	(2.7)
Bad CEOs	0.026	0.084	0.780	12.404
with Mandatory Plan	0.043	0.000	0.800	12.751
	(65.7)	(-100.0)	(2.7)	(2.8)
with Mandatory Plan and Use	0.051	0.000	1.000	12.928
	(97.6)	(-100.0)	(28.3)	(4.2)
Good CEOs	0.020	0.081	0.770	31.232
with Mandatory Plan	0.037	0.000	0.797	31.574
	(81.6)	(-100.0)	(3.5)	(1.1)
with Mandatory Plan and Use	0.046	0.000	1.000	31.743
	(124.8)	(-100.0)	(30.0)	(1.6)
Higher Leaving Probability	0.023	0.082	0.775	22.447
with Mandatory Plan	0.040	0.000	0.798	23.506
	(72.2)	(-100.0)	(3.0)	(4.7)
with Mandatory Plan and Use	0.048	0.000	1.000	23.379
	(110.3)	(-100.0)	(29.0)	(4.2)
Lower Leaving Probability	0.032	0.068	0.815	25.250
with Mandatory Plan	0.043	0.000	0.840	25.807
	(35.0)	(-100.0)	(3.0)	(2.2)
with Mandatory Plan and Use	0.048	0.000	1.000	25.744
	(50.8)	(-100.0)	(22.6)	(2.0)

succession plans and internal succession would raise shareholder value, albeit to a lesser degree. The latter finding underscores the importance of maintaining access to the outsiders' market when suitable internal candidates are unavailable.

This paper highlights the importance of CEO succession planning by quantifying its benefits and costs and evaluating policy reforms. It also opens several avenues for future research. For instance, it would be valuable to examine the role of compensation packages to CEOs and directors to improve the incentives to operate successions in a timely and smooth manner. Likewise, exploring how potential competition among internal CEO candidates and between them and the incumbent CEO affects the board's implementation of CEO succession plans is an important area for further study. Finally, while this paper uses firm-specific profitability as the metric of firm performance for consistency, it would be interesting to revisit our findings with other proxies, such as stock returns. These questions lie beyond the scope of this paper but become more important as we understand how succession plans impact firms.

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Internet Appendix

A Theory

In this section, we present the board's learning problem and derive the Bellman equation for the board's optimization problem. We use the assumptions outlined in Sections 3 and 4.

A.1 The Learning Problem of the Board

The learning problem of the board is a Kalman filtering problem. Before a CEO is hired, an ability level α is drawn from the initial prior distribution, $\mathcal{N}(\mu_0, \sigma_0^2)$, which is also the distribution of ability of the pool of potential CEOs. The level of the CEO's ability α is constant throughout the tenure at the firm. If there is a CEO succession plan in place, the board observes a signal about the best planned candidate CEO's ability w_t, which is normally distributed with mean equal to the candidate's ability and variance σ_w^2. Hence, if there is no CEO succession plan or the board decides not to promote a planned candidate, i.e., the new CEO is a non-planned candidate, the initial belief distribution about the new CEO is normally distributed with mean μ_0 and variance σ_0^2. Otherwise, the initial belief distribution about the new CEO, i.e., a planned candidate, is normally distributed with mean

$$\mu_0 + \frac{1}{1+\frac{\sigma_w^2}{\sigma_0^2}}(w_t - \mu_0) = \mu_0 + \frac{\frac{\sigma_0^2}{\sigma_w^2}}{1+\frac{\sigma_0^2}{\sigma_w^2}}(w_t - \mu_0) \tag{A.1}$$

and variance

$$\frac{1}{\frac{1}{\sigma_0^2}+\frac{1}{\sigma_w^2}} = \frac{\sigma_0^2}{1+\frac{\sigma_0^2}{\sigma_w^2}}. \tag{A.2}$$

Define

$$\bar{w} \equiv \frac{\frac{\sigma_0^2}{\sigma_w^2}}{1+\frac{\sigma_0^2}{\sigma_w^2}} = \frac{\sigma_0^2}{\sigma_0^2+\sigma_w^2}, \tag{A.3}$$

which is the percentage difference between the variance of a non-planned candidate CEO and the one of a planned candidate CEO, and $i_t \in \{0, 1\}$ as an indicator that equals 1 if the new CEO is a planned candidate and 0 otherwise. Then, the initial belief distribution about a new CEO hired at time t is normally distributed with mean

$$\mu_0 + i_t \bar{w}(w_t - \mu_0) \tag{A.4}$$

and variance

$$\sigma_0^2(1 - i_t\bar{w}). \tag{A.5}$$

Before a potential CEO turnover, the firm-specific profitability evolves as

$$y_t = \phi\alpha + (1-\phi)y_{t-1} + \varepsilon_t, \tag{A.6}$$

where ϕ is the persistence parameter and ε_t is an i.i.d. normal shock with mean 0 and variance σ_ε^2. In each period, the board observes the realization of y_t and uses it to update its beliefs. The time t variance of the belief distribution about the CEO's ability evolves as

$$\sigma^2(i_t, \tau_t) = \frac{1}{\frac{1}{\sigma^2(i_t,0)} + \tau_t\frac{\phi^2}{\sigma_\varepsilon^2}} = \frac{\sigma^2(i_t,0)}{1 + \tau_t\frac{\sigma^2(i_t,0)\phi^2}{\sigma_\varepsilon^2}}, \tag{A.7}$$

where $\sigma^2(i_t, 0)$ is the variance of the initial belief distribution for a CEO of type i_t. Define the persistence-adjusted profitability surprise at time t (prior to a potential turnover) as

$$\delta_{y,t} \equiv \frac{1}{\phi}y_t - \frac{1-\phi}{\phi}y_{t-1} - \mu_{t-1} = \alpha + \frac{\varepsilon_t}{\phi} - \mu_{t-1}. \tag{A.8}$$

The time t mean of the belief distribution about the CEO's ability evolves as

$$\mu_t = \mu_{t-1} + \frac{\frac{\sigma^2(i_t,\tau_t-1)\phi^2}{\sigma_\varepsilon^2}}{1 + \frac{\sigma^2(i_t,\tau_t-1)\phi^2}{\sigma_\varepsilon^2}}\delta_{y,t} = \mu_{t-1} + \frac{\frac{\sigma^2(i_t,0)\phi^2}{\sigma_\varepsilon^2}}{1 + \tau_t\frac{\sigma^2(i_t,0)\phi^2}{\sigma_\varepsilon^2}}\delta_{y,t}. \tag{A.9}$$

Since the mean of the posterior distribution can be decomposed into the initial prior mean and the accumulated difference, i.e., as $\mu_{t+s} = \mu_0 + \eta_{t+s}\ \forall s$, where η_{t+s} is the accumulated difference up to time $t + s$, the evolution of the time t accumulated difference equals

$$\eta_t = \eta_{t-1} + \frac{\frac{\sigma^2(i_t,0)\phi^2}{\sigma_\varepsilon^2}}{1 + \tau_t\frac{\sigma^2(i_t,0)\phi^2}{\sigma_\varepsilon^2}}\delta_{y,t}. \tag{A.10}$$

A.2 The Bellman Equation for the Problem of the Board

We derive the Bellman equation associated with the board optimization problem described in Section 3 as follows. The board's optimization problem can be rewritten as

$$\begin{aligned}
V_t &= \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s v_{t+s}\right] \\
&= \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s (\kappa Y_{t+s} B_{t+s} - f_{t+s} c_f^{board} B_{t+s} - a_{t+s}(1-p_{t+s}) c_a^{board} B_{t+s})\right] \\
&= \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s (\kappa x_t B_{t+s} + \kappa y_t B_{t+s} - f_{t+s} c_f^{board} B_{t+s} - a_{t+s}(1-p_{t+s}) c_a^{board} B_{t+s})\right],
\end{aligned} \tag{A.11}$$

where we substitute the expression of the per-period utility of the board v_t in equation (4) and the expression of the firm profitability in equation (1) in the first and second line, respectively. Since we assume that B_t is constant over time, i.e. $B_{t+s} = B_t \quad \forall s$, we divide both sides of the last equation by κB_t so to obtain

$$\begin{aligned}
\frac{V_t}{\kappa B_t} &= \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s (x_t + y_t - f_{t+s}\frac{c_f^{board}}{\kappa} - a_{t+s}(1-p_{t+s})\frac{c_a^{board}}{\kappa})\right] \\
&= \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s x_t\right] + \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s (y_t - f_{t+s}\hat{c}_f^{board} - a_{t+s}(1-p_{t+s})\hat{c}_a^{board})\right],
\end{aligned} \tag{A.12}$$

where we use the fact that the industry profitability component x_t is not affected by the board decisions and the definitions $\hat{c}_f^{board} \equiv c_f^{board}/\kappa$ and $\hat{c}_a^{board} \equiv c_a^{board}/\kappa$. We can then define the second term of the last equation as

$$VF_t \equiv \max_{\{f_{t+s},a_{t+s},u_{t+s}\}_{s=0}^{+\infty}} \mathbb{E}_t\left[\sum_{s=0}^{+\infty} \beta^s (y_t - f_{t+s}\hat{c}_f^{board} - a_{t+s}(1-p_{t+s})\hat{c}_a^{board})\right], \tag{A.13}$$

which is the expression of interest to derive the Bellman equation. Define as well $\hat{\delta}_{y,t} \equiv \alpha + \frac{\varepsilon_t}{\phi} - \mu_t$, which is the difference between the persistence-adjusted profitability signal prior to a potential turnover and the mean belief about the CEO's ability. This definition can be elucidated inspecting the expression of y_t in equation (2) and setting $l_t = f_t = 0$, since

$$\begin{aligned}
y_t = \phi\alpha + (1-\phi)y_{t-1} - c^{firm}(l_t + f_t)(1 - p_t u_t \chi) + \varepsilon_t = \phi\alpha + (1-\phi)y_{t-1} + \varepsilon_t \\
\Leftrightarrow \frac{y_t - (1-\phi)y_{t-1}}{\phi} = \alpha + \frac{\varepsilon_t}{\phi} \Leftrightarrow \frac{y_t - (1-\phi)y_{t-1}}{\phi} - \mu_t = \alpha + \frac{\varepsilon_t}{\phi} - \mu_t = \hat{\delta}_{y,t}
\end{aligned}$$

Hence, we have that

$$y_t = (1-\phi)y_{t-1} - c^{firm}(l_t + f_t)(1 - p_t u_t \chi) + \phi(\hat{\delta}_{y,t} + \mu_t).$$

Considering a generic period $t+s$ with $s \geq 0$, we get

$$y_{t+s} = (1-\phi)^{s+1} y_{t-1} + \sum_{k=0}^{s} (1-\phi)^{s-k}(-c^{firm}(l_{t+k} + f_{t+k})(1 - p_{t+k}u_{t+k}\chi) + \phi(\hat{\delta}_{y,t+k} + \mu_{t+k})),$$

which implies that

$$\begin{aligned}\mathbb{E}_t\left[\sum_{s=0}^{+\infty}\beta^s y_{t+s}\right] = \mathbb{E}_t\Bigg[& \sum_{s=0}^{+\infty}\beta^s(1-\phi)^{s+1}y_{t-1} + \\ & \sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}(-c^{firm}(l_{t+k} + f_{t+k})(1 - p_{t+k}u_{t+k}\chi)) + \\ & \sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}\phi\mu_{t+k}\Bigg]\end{aligned} \tag{A.14}$$

where we use the fact that $\mathbb{E}_t[\hat{\delta}_{y,t+k}] = 0 \ \forall k$ by the law of iterated expectations. The first term on the RHS is constant and so we can ignore it. Using the decomposition of μ_t mentioned before, we can rewrite the last term as

$$\sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}\phi\mu_{t+k} = \sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}\phi\mu_0 + \sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}\phi\eta_{t+k}.$$

Since the first term of the last expression is constant, we can ignore it as well. This implies that the expression we have to deal with is

$$\mathbb{E}_t\left[-c^{firm}\sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}(l_{t+k} + f_{t+k})(1 - p_{t+k}u_{t+k}\chi) + \phi\sum_{s=0}^{+\infty}\sum_{k=0}^{s}\beta^s(1-\phi)^{s-k}\eta_{t+k}\right],$$

which can be rewritten as

$$\frac{\phi}{1-\beta(1-\phi)}\sum_{s=0}^{+\infty}\beta^s\mathbb{E}_t[\eta_{t+s}] - \frac{c^{firm}}{1-\beta(1-\phi)}\sum_{s=0}^{+\infty}\beta^s\mathbb{E}_t[(l_{t+s} + f_{t+s})(1 - p_{t+s}u_{t+s}\chi)]. \tag{A.15}$$

Using these results, we get

$$V(\eta_t, i_t, \tau_t, p_t, \tilde{\eta}_t, l_t) = \max_{f_t, a_t, u_t} \Bigg\{ \frac{\phi \eta_t}{1-\beta(1-\phi)} - \frac{c^{firm}(l_t + f_t)(1 - \chi p_t u_t)}{1-\beta(1-\phi)} - \hat{c}_f^{board}(1-l_t)f_t - \hat{c}_a^{board}(1-p_t)a_t + \beta \mathbb{E}_t[V(\eta_{t+1}, i_{t+1}, \tau_{t+1}, p_{t+1}, \tilde{\eta}_{t+1}, l_{t+1})] \Bigg\}, \tag{A.16}$$

where $\tilde{\eta}_t$ is the difference between a planned candidate CEO and a non-planned candidate CEO if the board receives the signal w_t because of a plan. Hereafter, we drop the time subscripts and use the definition $\hat{c}^{firm} \equiv c^{firm}/(1-\beta(1-\phi))$ to simplify the notation.

If the incumbent CEO leaves and there is no plan, then

$$V_{l=1|p=0} = V(0,0,0,0,0,0) - \hat{c}^{firm}. \tag{A.17}$$

If the incumbent CEO leaves and there is a plan which the board does not use, then

$$V_{l=1|u=0} = V(0,0,0,0,0,0) - \hat{c}^{firm}. \tag{A.18}$$

Vice versa, if the incumbent CEO leaves and there is a plan which the board uses, then

$$V_{l=1|u=1}(\tilde{\eta}) = V(\tilde{\eta},1,0,0,0,0) - \hat{c}^{firm}(1-\chi). \tag{A.19}$$

This implies that if the incumbent CEO leaves and there is a plan, then

$$V_{l=1|p=1}(\tilde{\eta}) = \max_{u \in \{0,1\}} \{(1-u)V_{l=1|u=0} + uV_{l=1|u=1}(\tilde{\eta})\}. \tag{A.20}$$

Incorporating the shock attached to the decision of using the plan, we get

$$\mathbb{E}_{\epsilon_u}[V_{l=1|p=1}(\tilde{\eta})] = \lambda_u \ln \left(e^{\frac{V_{l=1|u=0}}{\lambda_u}} + e^{\frac{V_{l=1|u=1}(\tilde{\eta})}{\lambda_u}} \right)$$

$$\Rightarrow \mathbb{E}_{w'}[\mathbb{E}_{\epsilon_u}[V_{l=1|p=1}(\tilde{\eta}')]] = \mathbb{E}_{w'}\left[\lambda_u \ln \left(e^{\frac{V_{l=1|u=0}}{\lambda_u}} + e^{\frac{V_{l=1|u=1}(\tilde{\eta}')}{\lambda_u}} \right) \right], \tag{A.21}$$

which is the expected value function in the next period if the CEO leaves and there is a plan.

If the board fires the CEO and there is no plan, then

$$V_{f=1|p=0} = V(0,0,0,0,0,0) - \hat{c}^{firm} - \hat{c}_f^{board}. \tag{A.22}$$

If the board fires the CEO and there is a plan which the board does not use, then

$$V_{f=1|u=0} = V(0,0,0,0,0,0) - \hat{c}^{firm} - \hat{c}_f^{board}. \tag{A.23}$$

Vice versa, if the board fires the CEO and there is a plan which the board uses, then

$$V_{f=1|u=1}(\tilde{\eta}) = V(\tilde{\eta},1,0,0,0,0) - \hat{c}^{firm}(1-\chi) - \hat{c}_f^{board}. \tag{A.24}$$

This implies that if the board fires the CEO and there is a plan, then

$$V_{f=1|p=1}(\tilde{\eta}) = \max_{u\in\{0,1\}}\{(1-u)V_{f=1|u=0} + uV_{f=1|u=1}(\tilde{\eta})\}. \tag{A.25}$$

Incorporating the shock attached to the decision of using the plan, then

$$\mathbb{E}_{\epsilon_u}[V_{f=1|p=1}(\tilde{\eta})] = \lambda_u \ln\left(e^{\frac{V_{f=1|u=0}}{\lambda_u}} + e^{\frac{V_{f=1|u=1}(\tilde{\eta})}{\lambda_u}}\right). \tag{A.26}$$

If the CEO does not leave and the board keeps its CEO with a plan in place, then

$$\begin{aligned} V_{f=0}(\eta,i,\tau,1,\tilde{\eta},0) = \frac{\phi\eta}{1-\beta(1-\phi)} &+ \beta(q(\tau+1)\mathbb{E}_{w'}[\mathbb{E}_{\epsilon_u}[V_{l=1|p=1}(\tilde{\eta}')]] \\ &+ (1-q(\tau+1))\mathbb{E}[V(\eta',i,\tau+1,1,\tilde{\eta}',0)]). \end{aligned} \tag{A.27}$$

This implies that if the CEO does not leave with a plan in place, then

$$V(\eta,i,\tau,1,\tilde{\eta},0) = \max_{f\in\{0,1\}}\{(1-f)V_{f=0}(\eta,i,\tau,1,\tilde{\eta},0) + f\mathbb{E}_{\epsilon_u}[V_{f=1|p=1}(\tilde{\eta})]\}. \tag{A.28}$$

Incorporating the shock attached to the decision of firing the CEO, then

$$\mathbb{E}_{\epsilon_f}[V(\eta,i,\tau,1,\tilde{\eta},0)] = \lambda_f \ln\left(e^{\frac{V_{f=0}(\eta,i,\tau,1,\tilde{\eta},0)}{\lambda_f}} + e^{\frac{\mathbb{E}_{\epsilon_u}[V_{f=1|p=1}(\tilde{\eta})]}{\lambda_f}}\right). \tag{A.29}$$

If the CEO does not leave and the board keeps its CEO without a plan in place, then there are two cases to consider. If the board decide to not adopt a plan, then

$$\begin{aligned} V_{f=0|a=0}(\eta,i,\tau,0,0,0) = \frac{\phi\eta}{1-\beta(1-\phi)} &+ \beta(q(\tau+1)V_{l=1|p=0} \\ &+ (1-q(\tau+1))\mathbb{E}[V(\eta',i,\tau+1,0,0,0)]). \end{aligned} \tag{A.30}$$

If the board decides to adopt a plan, then

$$V_{f=0|a=1}(\eta,i,\tau,0,0,0) = \frac{\phi\eta}{1-\beta(1-\phi)} - \hat{c}_a^{board} + \beta(q(\tau+1)\mathbb{E}_{w'}[\mathbb{E}_{\epsilon_u}[V_{l=1|p=1}(\tilde{\eta}')]] + (1-q(\tau+1))\mathbb{E}[V(\eta',i,\tau+1,1,\tilde{\eta}',0)]). \quad \text{(A.31)}$$

This implies that if the CEO stays and there is no plan, then

$$V_{f=0}(\eta,i,\tau,0,0,0) = \max_{a\in\{0,1\}}\{(1-a)V_{f=0|a=0}(\eta,i,\tau,0,0,0) + aV_{f=0|a=1}(\eta,i,\tau,0,0,0)\}. \quad \text{(A.32)}$$

Incorporating the shock attached to the decision of adopting a plan, then

$$\mathbb{E}_{\epsilon_a}[V_{f=0}(\eta,i,\tau,0,0,0)] = \lambda_a \ln\left(e^{\frac{V_{f=0|a=0}(\eta,i,\tau,0,0,0)}{\lambda_a}} + e^{\frac{V_{f=0|a=1}(\eta,i,\tau,0,0,0)}{\lambda_a}}\right). \quad \text{(A.33)}$$

This implies that if the CEO does not leave without a plan in place, then

$$V(\eta,i,\tau,0,0,0) = \max_{f\in\{0,1\}}\{(1-f)\mathbb{E}_{\epsilon_a}[V_{f=0}(\eta,i,\tau,0,0,0)] + fV_{f=1|p=0}\}. \quad \text{(A.34)}$$

Incorporating the shock attached to the decision of firing the CEO, then

$$\mathbb{E}_{\epsilon_f}[V(\eta,i,\tau,0,0,0)] = \lambda_f \ln\left(e^{\frac{\mathbb{E}_{\epsilon_a}[V_{f=0}(\eta,i,\tau,0,0,0)]}{\lambda_f}} + e^{\frac{V_{f=1|p=0}}{\lambda_f}}\right). \quad \text{(A.35)}$$

The Bellman equation associated with the board's problem is given by the conditions provided in the equations (A.17), (A.18), (A.19), (A.21), (A.22), (A.23), (A.24), (A.26), (A.27), (A.29), (A.30), (A.31), (A.33), and (A.35), that the value function $V(\eta,i,\tau,p,\tilde{\eta},0)$ solves.

This solution implies the following policy functions. The probability that the board fires the CEO if there is a plan is

$$p_{f=1}(\eta,i,\tau,1,\tilde{\eta},0) = \frac{e^{\frac{\mathbb{E}_{\epsilon_u}[V_{f=1|p=1}(\tilde{\eta})]}{\lambda_f}}}{e^{\frac{\mathbb{E}_{\epsilon_u}[V_{f=1|p=1}(\tilde{\eta})]}{\lambda_f}} + e^{\frac{V_{f=0}(\eta,i,\tau,1,\tilde{\eta},0)}{\lambda_f}}}. \quad \text{(A.36)}$$

The probability that the board fires the CEO if there is no plan is

$$p_{f=1}(\eta,i,\tau,0,0,0) = \frac{e^{\frac{V_{f=1|p=0}}{\lambda_f}}}{e^{\frac{V_{f=1|p=0}}{\lambda_f}} + e^{\frac{\mathbb{E}_{\epsilon_a}[V_{f=0}(\eta,i,\tau,0,0,0)]}{\lambda_f}}}. \quad \text{(A.37)}$$

The probability that the board adopts a a plan is

$$p_{a=1}(\eta, i, \tau, 0, 0, 0) = \frac{e^{\frac{V_{f=0|a=1}(\eta,i,\tau,0,0,0)}{\lambda_a}}}{e^{\frac{V_{f=0|a=1}(\eta,i,\tau,0,0,0)}{\lambda_a}} + e^{\frac{V_{f=0|a=0}(\eta,i,\tau,0,0,0)}{\lambda_a}}}. \tag{A.38}$$

The probability that the board uses a plan after the CEO has been fired is

$$p_u(\tilde{\eta}) = \frac{e^{\frac{V_{f=1|u=1}(\tilde{\eta})}{\lambda_u}}}{e^{\frac{V_{f=1|u=1}(\tilde{\eta})}{\lambda_u}} + e^{\frac{V_{f=1|u=0}}{\lambda_u}}}. \tag{A.39}$$

Dividing and multiplying that last expression by its numerator, it is possible to see that the probability that the board uses a plan after a CEO has been fired is equal to the probability that the board uses a plan after a CEO has left.

B Data

This section provides details about the data construction and the estimation procedure.

B.1 Data Construction

Our sample starts in 1998, as this is the first year that electronic filing of proxy statements was required (see McConnell and Qi (2022)). It ends in 2018, as this is the last year for which we have the data about forced CEO turnovers provided by Florian Peters and Alexander Wagner on WRDS (see Peters and Wagner (2014) and Jenter and Kanaan (2015)). Since we use the ExecuComp database to obtain data about CEOs' characteristics, our sample consists of S&P 1500 firms representing the largest public companies in the US economy.

Data about firms' financials are from the annual Compustat database. We keep observations of firms incorporated in the US. We drop observations with missing or negative book assets and sales. We define firm total profitability as the return on assets (ROA). We compute the ROA by dividing operating income before depreciation by the average book assets in the current and previous fiscal years. We exclude observations with ROA missing or greater than 100% in absolute value. We compute leverage as the ratio of the book value of debt to the book value of assets, market-to-book as the book value of assets plus firm market value minus book value of equity scaled by the book value of assets, and sales growth rate as the difference between the current and previous period sales divided by the previous period sales. We yearly winsorize these variables at the 1% and 99% levels. Each data item used to construct these variables is normalized in 2018 US dollars using data downloaded from the Federal Reserve Economic Data (FRED) database at the St. Louis Fed website. We define industry profitability as the yearly industry average ROA using the Fama and French 12 industry classification. We compute this measure considering the largest 3,000 firms in Compustat by their book assets in a given year. Given their size, these firms represent the most relevant competitors for the large companies in our sample. Finally, we subtract the industry profitability from ROA to measure firm excess profitability.

Data about CEOs are from the ExecuComp database. We employ a cleaning procedure akin to that outlined in the Internet Appendix of Taylor (2013). We drop executives who do not have information about the date they became CEO. Using the same date, we also exclude executives' observations before they became CEOs and if their first fiscal year in office is less than 6 months long. We fill in missing CEO indicators by labeling an executive to be CEO in a firm-year observation if ExecuComp lists no one as CEO in the given firm-year observation and (i) the executive was the CEO of the firm in the previous and following year, (ii) the executive was the CEO of the firm in the previous year and ExecuComp does not list any executive as the CEO of the firm in the following year, or (iii) the executive was the CEO of the firm in the following year and ExecuComp does not list any executive as the CEO of the firm in the previous year. Since for less than 0.15% of the firm-year observations we are still unable to identify which executive is the CEO after this procedure, we use information about the date the executives left the CEO position and about their compensation, which we compute following the procedure described in the Internet Appendix of Matveyev (2017). We exclude all the observations of CEOs whose initial date is more than one year after their first yearly record as CEO in ExecuComp. We classify CEO turnovers into forced and voluntary using the data provided by Florian Peters and Alexander Wagner on WRDS (see Peters and Wagner (2014) and Jenter and Kanaan (2015)). We label a CEO as an internal successor if the executive worked at the firm for at least 1 year before becoming CEO.

We collect data about firms' disclosures of CEO succession plans using the methodology described in McConnell and Qi (2022). We employ a crawling algorithm to search the SEC proxy filings on the SEC EDGAR website for four keyword phrases: "succession planning," "succession plan(s)," "management development," and "leadership development." If any of these phrases is identified, we search in the same paragraph for one of four additional keyword phrases: "CEO," "chief executive officer," "president," and "key executive." If a paragraph in a proxy filing contains such phrasing and there is no CEO turnover in the same year of the filing, we consider this disclosure to indicate the adoption of a CEO succession plan, provided that it is the first time this information is reported during a CEO's tenure. We use information on fiscal year-end months and CEO turnover dates to confirm the accuracy of our classifications. We do not distinguish between "in-depth" and "in-passing" disclosures of CEO succession plan as in McConnell and Qi (2022) or manually verify as in Cvijanovic et al. (2023). These classifications are not critical for our research's purposes and could still be subjective, as discussed in McConnell and Qi (2022). While we may overstate the number of cases in which a CEO succession plan is in place, our statistics are not much different from those of both papers, and our results can be considered lowerbounds of the effects we find. Table B.1 presents statistics about turnovers and plans during our sample period.

For the estimations on the subsamples, we use the Thomson Reuters 13F database for information about institutional ownership and the BoardEx database for boards' characteristics. Following Owen and Temesvary (2018), we classify a director as independent if they are labeled as a non-executive director by BoardEx and indicated as independent in their role name description.

Table B.1: Yearly Summary Statistics about Turnovers and CEO Succession Plans

This table reports the number of firms in column (1), the number and fraction of firms experiencing a CEO turnover in columns (2) and (3), the number and fraction of firms experiencing a forced CEO turnover in columns (4) and (5), the number and fraction of firms adopting a CEO succession plan in columns (6) and (7), and the number and fraction of firms with a CEO succession plan in place in columns (8) and (9).

	No.	No. of T/O	Frac. with T/O	No. Forced T/O	Frac. with Forced T/O	No. Adopting	Frac. Adopting	No. with Plan	Frac. with Plan
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1998	1708	179	0.10	31	0.02	126	0.07	0	0.00
1999	1645	200	0.12	62	0.04	56	0.03	117	0.07
2000	1595	221	0.14	53	0.03	34	0.02	134	0.08
2001	1618	162	0.10	39	0.02	40	0.02	134	0.08
2002	1644	182	0.11	55	0.03	63	0.04	143	0.09
2003	1675	167	0.10	40	0.02	156	0.09	188	0.11
2004	1653	212	0.13	51	0.03	206	0.12	309	0.19
2005	1569	173	0.11	45	0.03	140	0.09	442	0.28
2006	1712	197	0.12	42	0.02	160	0.09	499	0.29
2007	1998	272	0.14	79	0.04	192	0.10	553	0.28
2008	1940	216	0.11	52	0.03	175	0.09	616	0.32
2009	1916	165	0.09	54	0.03	155	0.08	710	0.37
2010	1881	203	0.11	47	0.02	217	0.12	773	0.41
2011	1843	226	0.12	58	0.03	169	0.09	872	0.47
2012	1806	201	0.11	55	0.03	180	0.10	899	0.50
2013	1801	192	0.11	47	0.03	167	0.09	955	0.53
2014	1777	205	0.12	46	0.03	151	0.08	978	0.55
2015	1737	229	0.13	46	0.03	165	0.09	990	0.57
2016	1669	212	0.13	58	0.03	165	0.10	986	0.59
2017	1620	203	0.13	42	0.03	156	0.10	986	0.61
2018	1580	202	0.13	48	0.03	164	0.10	981	0.62
Total	36387	4219	0.12	1050	0.03	3037	0.08	12265	0.34

B.2 SMM Estimation

We estimate the model using the simulated method of moments (SMM) of Lee and Ingram (1991). Given the panel structure of our data, we follow the approach described in Nikolov and Whited (2014) and Bazdresch et al. (2018) for constructing the weighting matrix and the standard errors. The intuition behind the SMM approach is to find the set of parameter values that minimizes the weighted distance between a set of moments generated by solving and simulating the model and their empirical counterparts in the data. Formally, the vector of SMM parameter estimates, $\hat{\theta}$, is given by

$$\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \left(\hat{h} - \frac{1}{K} \sum_{k=1}^{K} h_k(\theta) \right)' \hat{W} \left(\hat{h} - \frac{1}{K} \sum_{k=1}^{K} h_k(\theta) \right), \tag{B.1}$$

where $\hat{h}$ denotes the vector of empirical moments, K is the number of times the model is simulated, $h_k(\theta)$ denotes the vector of model-simulated moments for the parameter vector θ and simulation k, and $\hat{W}$ is the weighting matrix.

Following Michaelides and Ng (2000), we set $K = 10$ to alleviate simulation bias. For the weighting matrix, $\hat{W}$, we use the inverse of the covariance matrix of the empirical moments, constructed using the influence function approach of Erickson and Whited (2002). When constructing the influence functions, we remove firm fixed effects to ensure that the influence functions reflect within-firm variation. We solve the numerical minimization problem in equation (B.1) using a global genetic algorithm.

We compute the standard errors using a clustered covariance matrix, $\hat{\Omega}$. Letting G denote the Jacobian matrix of the moment conditions and $\hat{W}$ the weighting matrix described above, the covariance matrix for the model parameters is given by

$$\left(1 + \frac{1}{K}\right)(G'\hat{W}G)^{-1}G'\hat{W}\hat{\Omega}\hat{W}G(G'\hat{W}G)^{-1}. \tag{B.2}$$

To address concerns about the presence of unobserved heterogeneity in the data that is absent from our model, we compute the autocorrelation moment using the method of Han and Phillips (2010) and calculate moments other than means after removing fixed effects.

In the final part of this section, we discuss the identification of the model's structural parameters. We estimate 12 parameters: the mean of the board's prior beliefs, μ_0, the standard deviation of the board's prior beliefs, σ_0, the parameter controlling the firm-specific profitability persistence, ϕ, the standard deviation of the firm-specific profitability shock, σ_ε, the pecuniary turnover cost to the firm, c^{firm}, the scaled personal cost of firing to the board, c_f^{board}/κ, the scaled personal cost of adopting to the board, c_a^{board}/κ, the standard deviation of the initial signal about the planned candidate, σ_w, the turnover cost saving effectiveness, χ, the scale parameter of the preference shocks attached to the decision of firing the CEO, λ_f, the scale parameter of the preference shocks attached to the decision of using a plan, λ_u, and the scale parameter of the preference shocks attached to the decision of adopting a plan, λ_a.

Consider a period t and a CEO-firm pair i. The 25 moments that we use to identify the model's parameters are: the autocorrelation of the firm-specific profitability, $AC(y_{i,t})$, the mean intercept obtained from computing the autocorrelation, $E[Intercept_i]$, the variance of the residuals obtained from computing the autocorrelation, $Var(\epsilon_{i,t})$, the variance of the CEO-specific mean persistence-adjusted firm-specific profitability, $Var(E_i[e_{i,t}])$, the mean CEO-specific variance of the persistence-adjusted firm-specific profitability, $E[Var_i(e_{i,t})]$, the forced CEO turnover rate, $E[f_{i,t}]$, the plan adoption rate, $E[a_{i,t}]$, the plan usage rate, $E[u_{i,t}]$, the mean firm-specific profitability 2 years before a forced CEO turnover, $E[y_{i,t}|f_{i,t+2} = 1]$, the mean firm-specific profitability 1 year before a forced CEO turnover, $E[y_{i,t}|f_{i,t+1} = 1]$, the mean firm-specific profitability in the year of a forced CEO turnover, $E[y_{i,t}|f_{i,t} = 1]$, the mean firm-specific profitability 1 year after a forced CEO turnover, $E[y_{i,t}|f_{i,t-1} = 1]$, the mean firm-specific profitability 2 years after a forced CEO turnover, $E[y_{i,t}|f_{i,t-2} = 1]$, the mean firm-specific profitability 2 years before a forced CEO turnover with a plan, $E[y_{i,t}|f_{i,t+2} = 1, p_{i,t+2} = 1]$, the mean firm-specific profitability 1 year before a forced CEO turnover with a plan, $E[y_{i,t}|f_{i,t+1} = 1, p_{i,t+1} = 1]$, the mean firm-specific profitability in the year of a forced CEO turnover with a plan, $E[y_{i,t}|f_{i,t} = 1, p_{i,t} = 1]$, the mean firm-specific profitability 1 year after a forced CEO turnover with a plan, $E[y_{i,t}|f_{i,t-1} = 1, p_{i,t-1} = 1]$, the mean firm-specific profitability 2 years after a forced CEO turnover with a plan, $E[y_{i,t}|f_{i,t-2} = 1, p_{i,t-2} = 1]$, the mean firm-specific profitability 2 years before a forced turnover of a planned CEO, $E[y_{i,t}|f_{i,t+2} = 1, i_{i,t+2} = 1]$, the mean firm-specific profitability 1 year before a forced turnover of a planned CEO, $E[y_{i,t}|f_{i,t+1} = 1, i_{i,t+1} = 1]$, the mean firm-specific profitability in the year of a forced turnover of a planned CEO, $E[y_{i,t}|f_{i,t} = 1, i_{i,t} = 1]$, the mean firm-specific profitability change in the year of a forced CEO turnover with a plan used, $E[\Delta y_{i,t}|f_{i,t} = 1, u_{i,t} = 1]$, the mean firm-specific profitability in the year of a plan adoption, $E[y_{i,t}|a_{i,t} = 1]$, the coefficient of forced CEO turnover on lagged firm-specific profitability, $\beta(f_{i,t}, y_{i,t-1})$, and the coefficient of plan adoption on lagged firm-specific profitability, $\beta(a_{i,t}, y_{i,t-1})$.

As in the Internet Appendix of Frydman and Papanikolaou (2018), we report the elasticities of moments with respect to parameters and the elasticities of parameters with respect to moments to support our identification strategy. In Figures B.1, B.2, B.3, B.4, B.5, and

B.6, we report the first type of elasticities, which we compute as

$$g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i, \tag{B.3}$$

where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters. In Figures B.7 and B.8, we report the second type of elasticities, which we compute as

$$\lambda_{i,j}h(\hat{\theta})_j/\hat{\theta}_i, \tag{B.4}$$

where $\lambda_{i,j}$ is the element of the sensitivity matrix Λ that corresponds to moment i and parameter j, $h(\hat{\theta})_j$ is the model implied j-th moment evaluated at the estimated values of the parameters, and $\hat{\theta}_i$ is the estimated value of the i-th parameter. We compute the sensitivity matrix following Andrews et al. (2017).

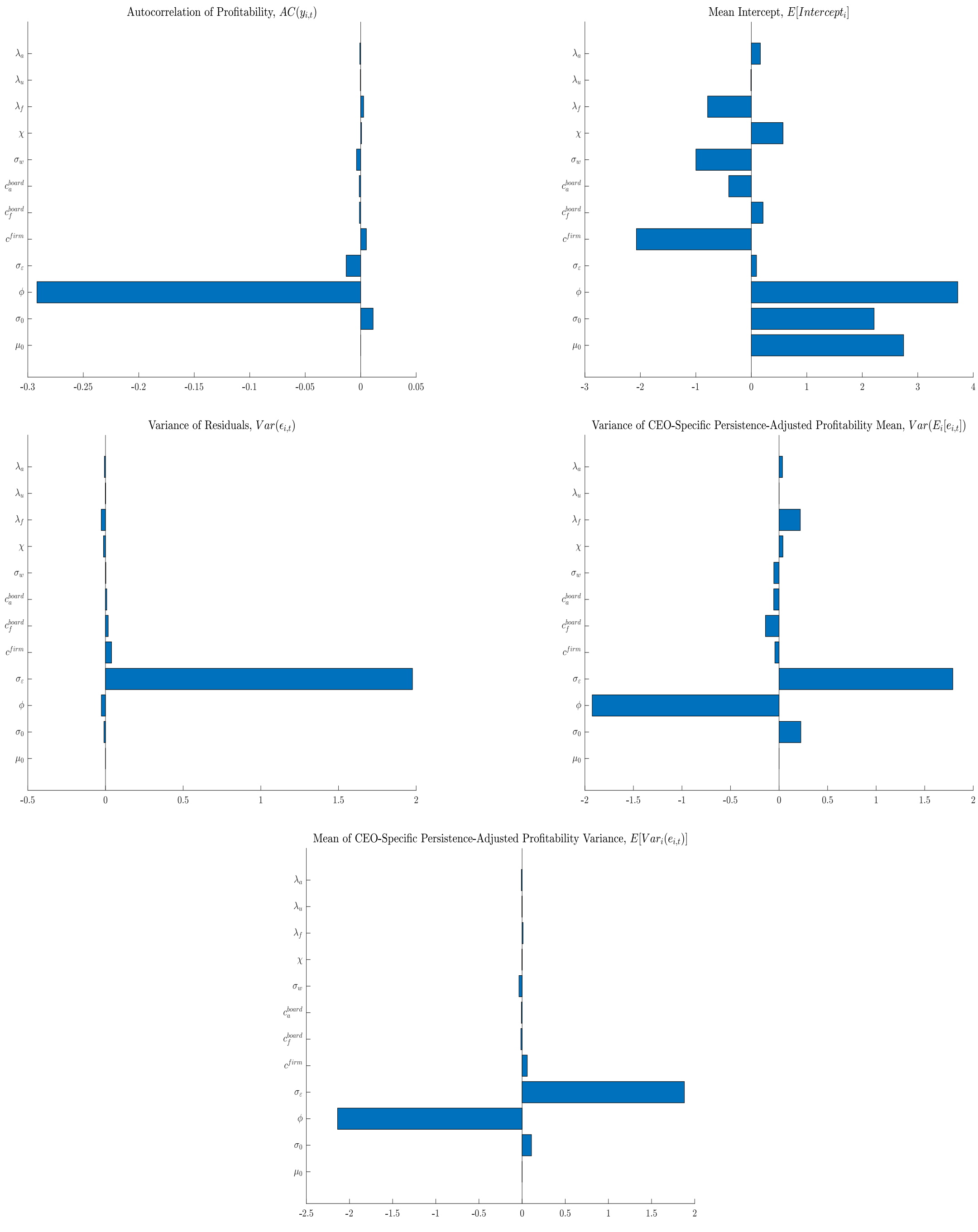

Figure B.1: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

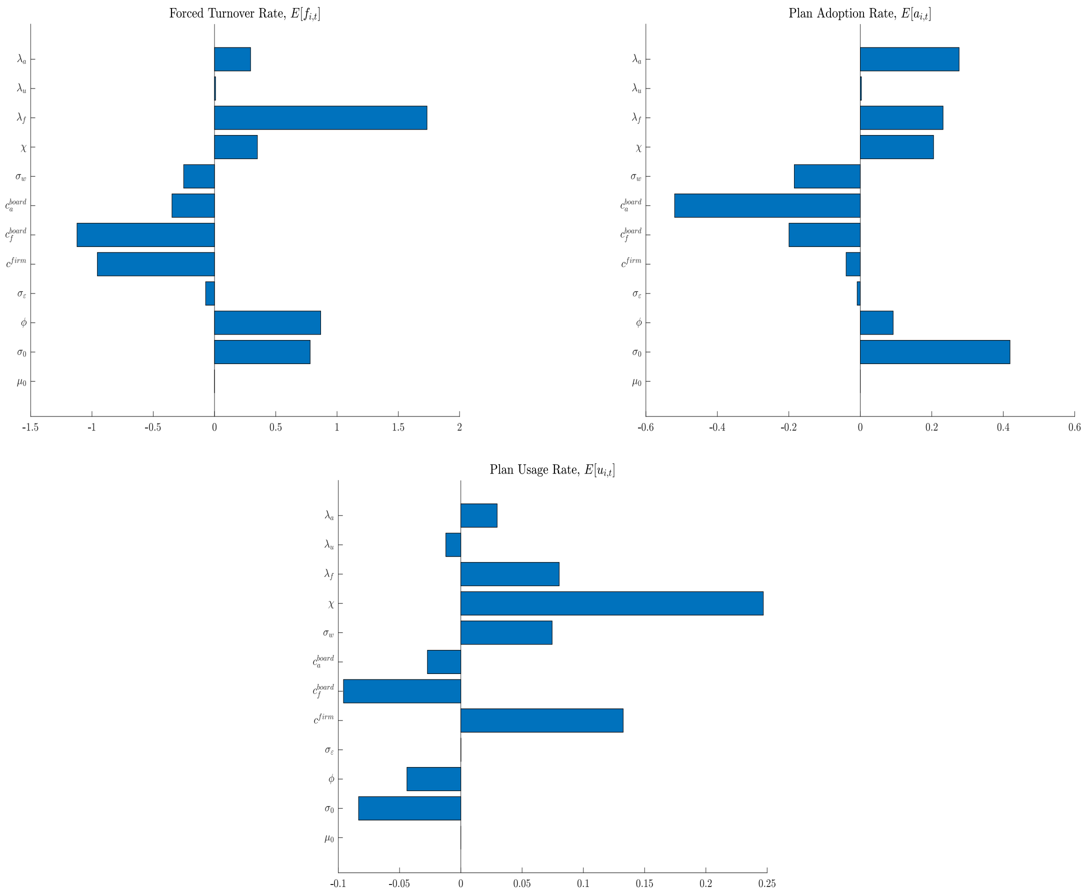

Figure B.2: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

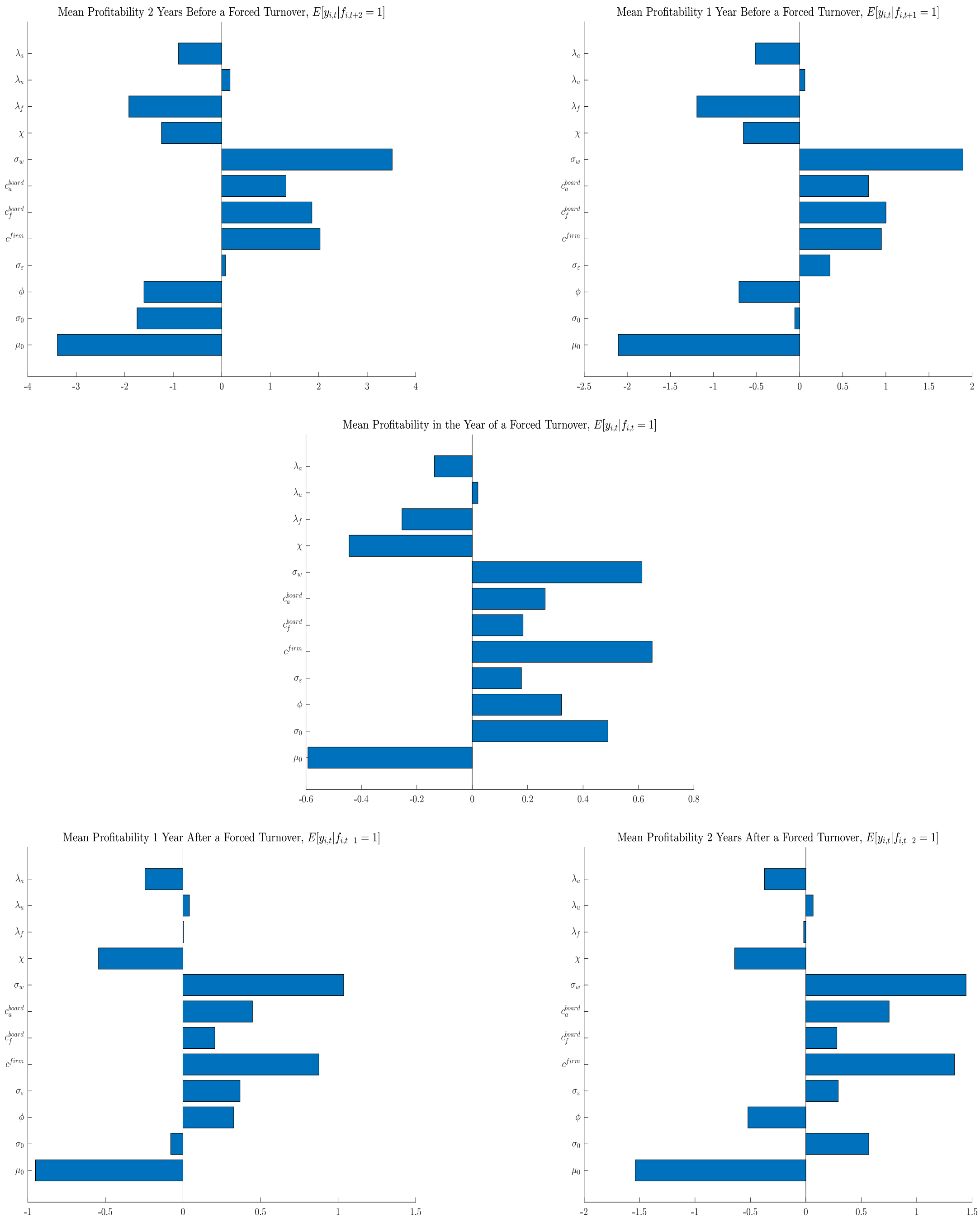

Figure B.3: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

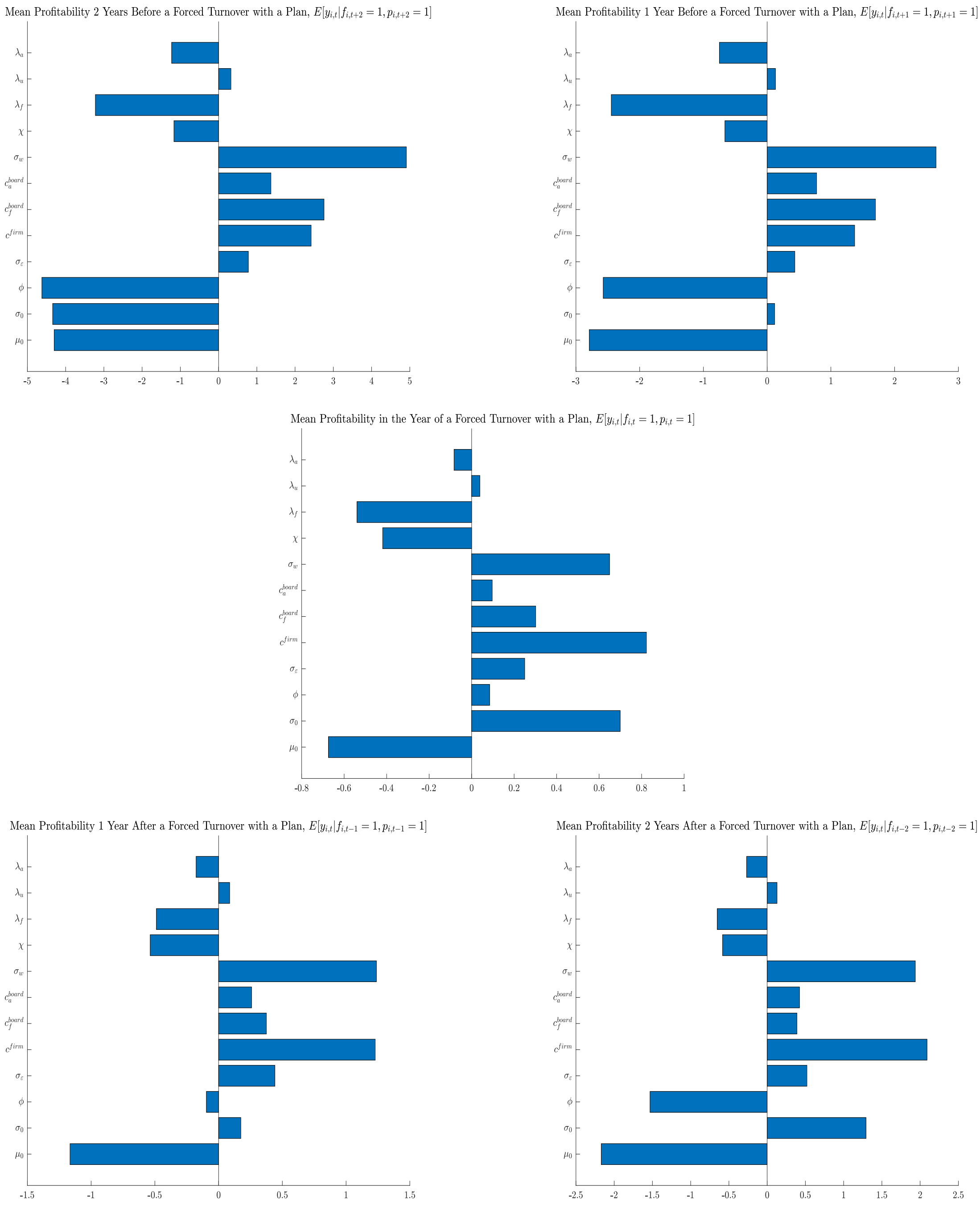

Figure B.4: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

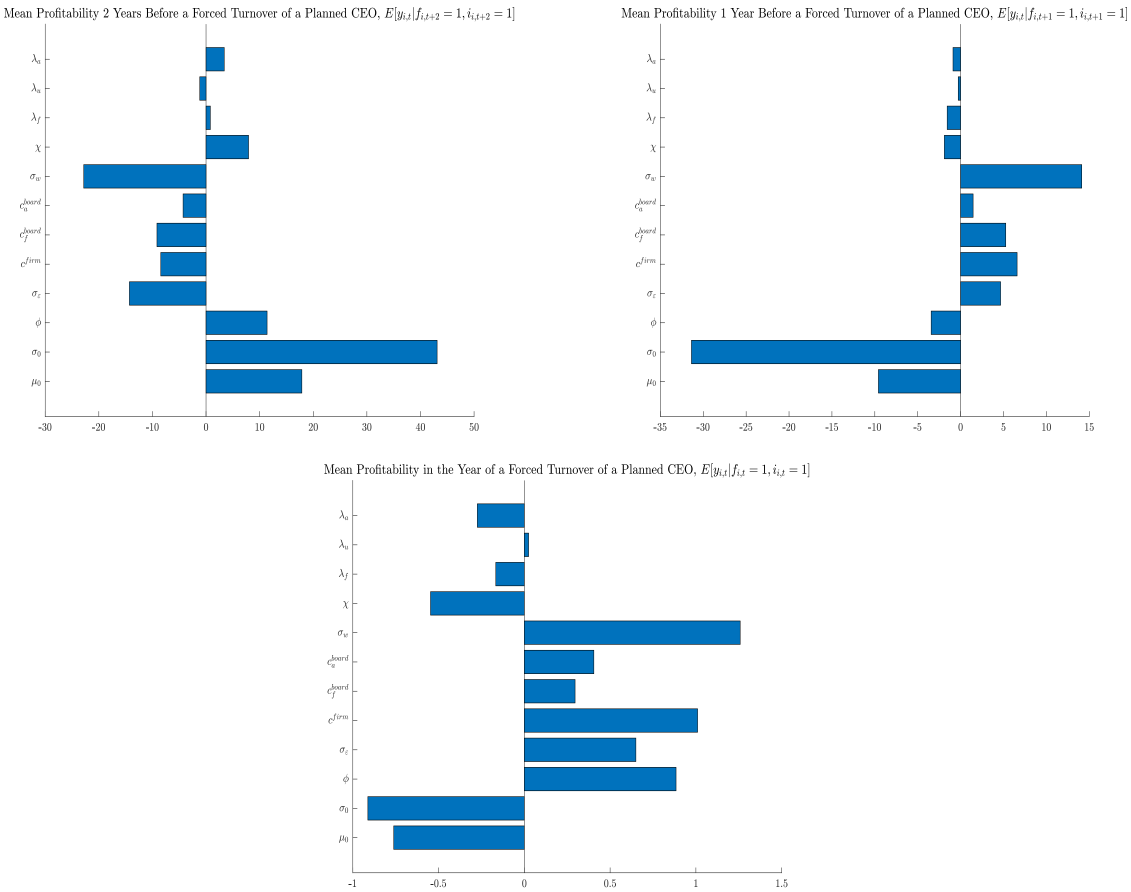

Figure B.5: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

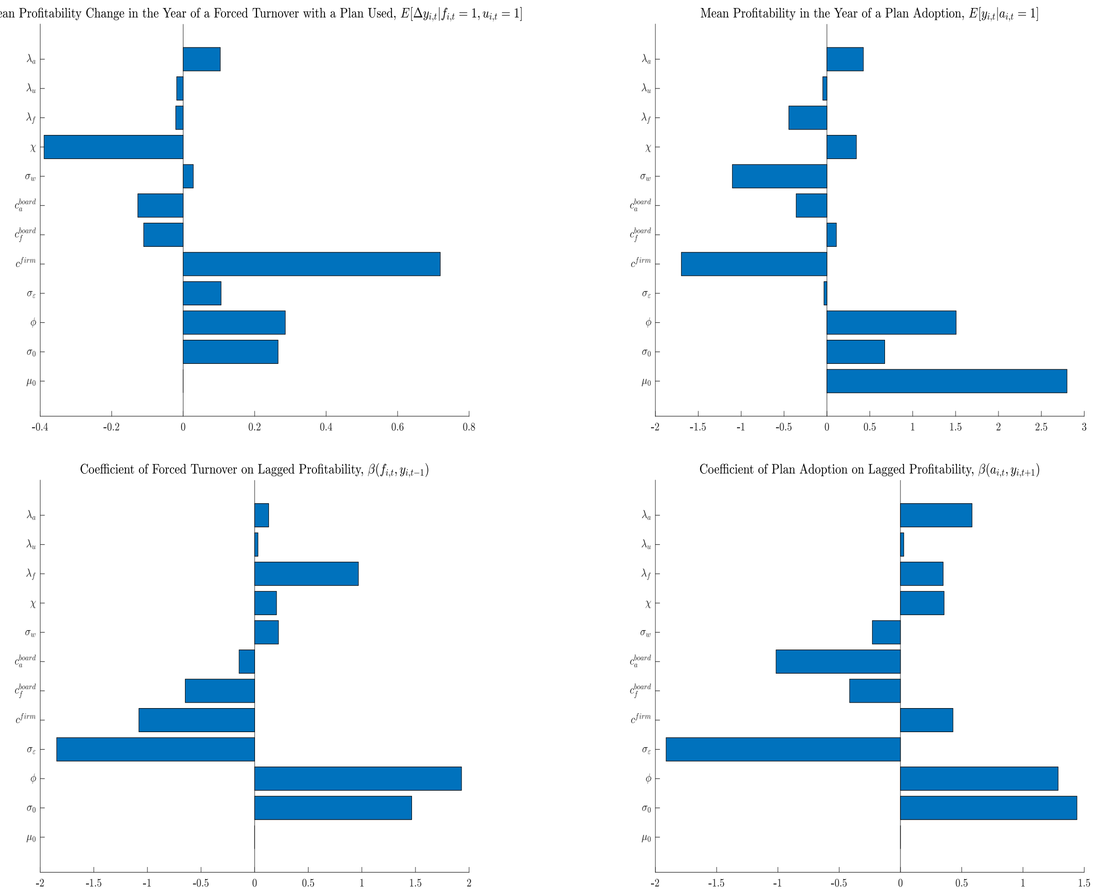

Figure B.6: Elasticities of Moments to Parameters

This figure shows the elasticities of moments with respect to parameters. Specifically, we plot the measure $g_{i,j}\hat{\theta}_j/h(\hat{\theta})_i$, where $g_{i,j}$ is the element of the gradient matrix G that corresponds to moment i and parameter j, $\hat{\theta}_j$ is the estimated value of the j-th parameter, and $h(\hat{\theta})_i$ is the model implied i-th moment evaluated at the estimated values of the parameters.

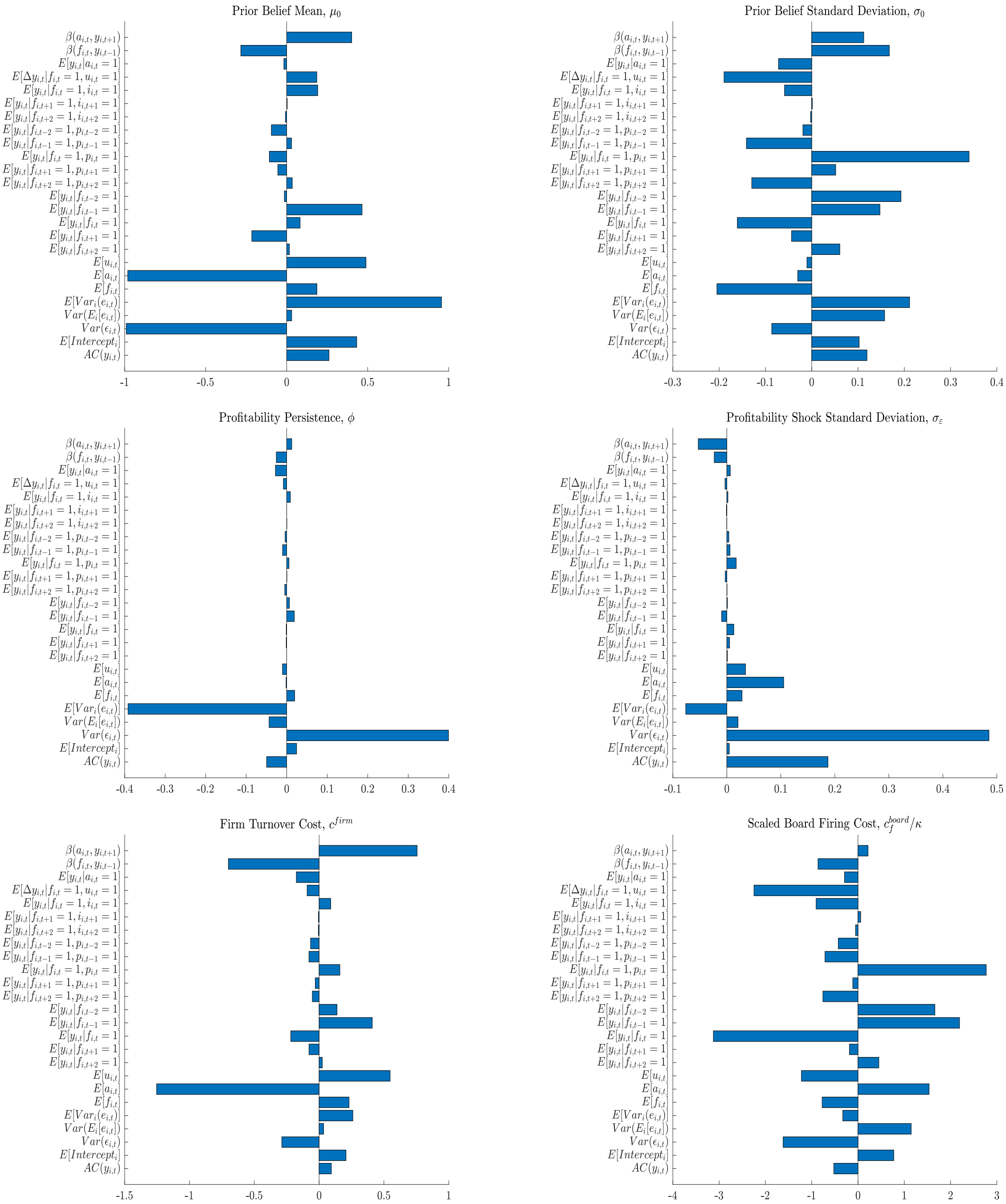

Figure B.7: Elasticities of Parameters to Moments

This figure shows the elasticities of parameters with respect to moments. Specifically, we plot the measure $\lambda_{i,j} h(\hat{\theta})_j / \hat{\theta}_i$, where $\lambda_{i,j}$ is the element of the sensitivity matrix Λ that corresponds to moment i and parameter j, $h(\hat{\theta})_j$ is the model implied j-th moment evaluated at the estimated values of the parameters, and $\hat{\theta}_i$ is the estimated value of the i-th parameter. We compute the sensitivity matrix following Andrews et al. (2017).

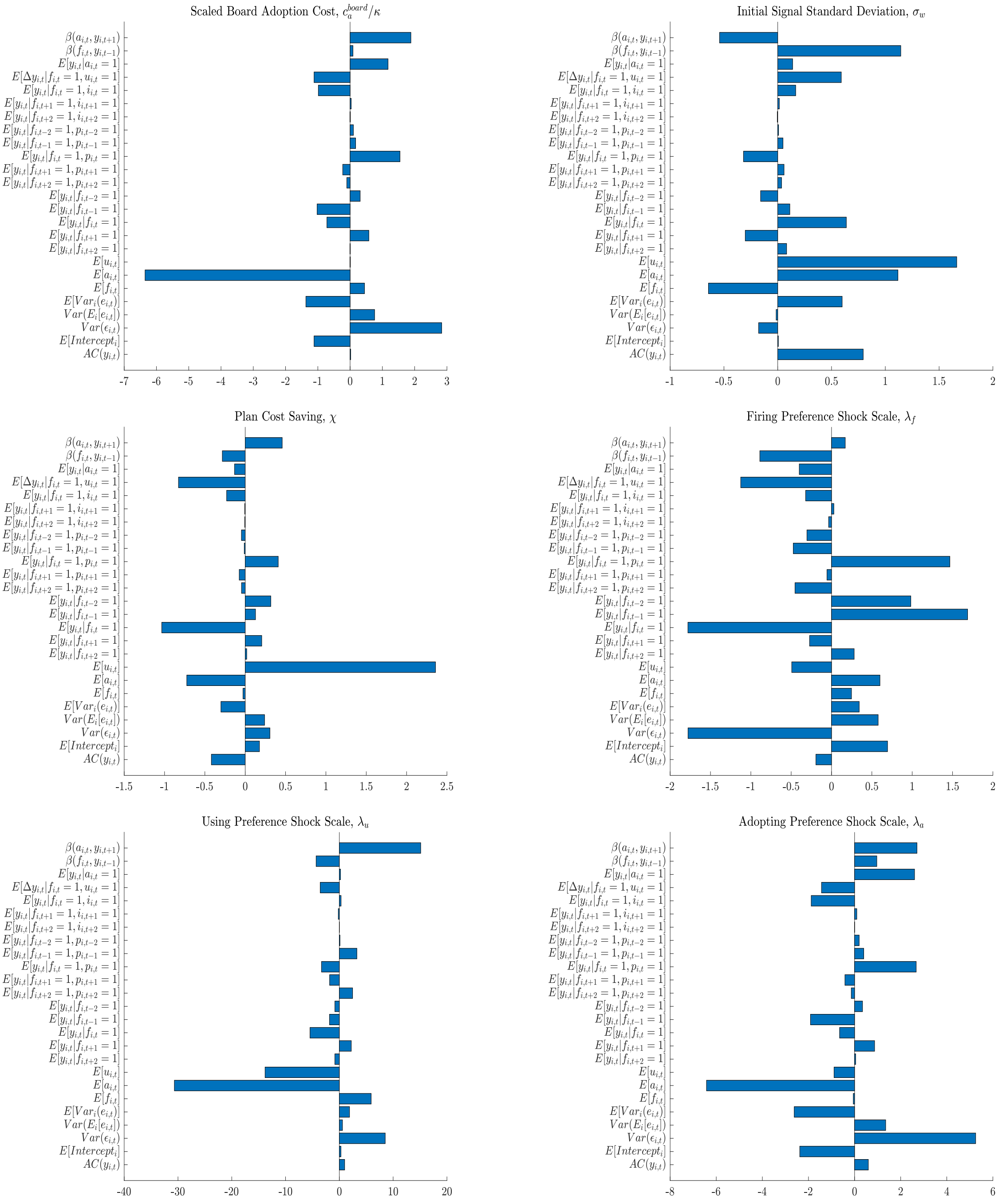

Figure B.8: Elasticities of Parameters to Moments

This figure shows the elasticities of parameters with respect to moments. Specifically, we plot the measure $\lambda_{i,j} h(\hat{\theta})_j / \hat{\theta}_i$, where $\lambda_{i,j}$ is the element of the sensitivity matrix Λ that corresponds to moment i and parameter j, $h(\hat{\theta})_j$ is the model implied j-th moment evaluated at the estimated values of the parameters, and $\hat{\theta}_i$ is the estimated value of the i-th parameter. We compute the sensitivity matrix following Andrews et al. (2017).

Table B.2 summarizes the identification strategy used in the SMM estimation.

Table B.2: Summary of the Identification Strategy

This table summarizes the identification strategy used in the SMM estimation.

	Symbol	Mainly Identified off
Productivity		
Mean of Prior Beliefs	μ_0	Mean Intercept
Standard Deviation of Prior Beliefs	σ_0	Variance of CEO-Specific Persistence-Adjusted Profitability Mean
Persistence of Profitability	ϕ	Autocorrelation of Profitability
Standard Deviation of Profitability Shocks	σ_ϵ	Mean of CEO-Specific Persistence-Adjusted Profitability Variance
		Variance of Residuals
Firing		
Firm Turnover Cost	c^{firm}	Mean Profitability in the Year of a Forced Turnover
Board Firing Cost	c_f^{board}/κ	Forced Turnover Rate
Scale of the Firing Preference Shocks	λ_f	Mean Profitability in the Years Around a Forced Turnover
		Coefficient of Forced Turnover on Lagged Profitability
Adopting		
Board Adoption Cost	c_a^{board}/κ	Plan Adoption Rate
Scale of the Adopting Preference Shocks	λ_a	Mean Profitability in the Year of a Plan Adoption
		Coefficient of Plan Adoption on Lagged Profitability
Using		
Standard Deviation of the Initial Signal	σ_w	Mean Profitability in the Years up to a Forced Turnover of a Planned CEO
Turnover Cost Saving Effectiveness	χ	Mean Profitability Change in the Year of a Forced Turnover with a Plan Used
Scale of the Using Preference Shocks	λ_u	Plan Usage Rate
		Mean Profitability in the Years Around a Forced Turnover with a Plan

Hereafter, we present the SMM estimation results on the subamples discussed in Section 4.4.

Table B.3: SMM Results on Large and Small Firms

This table reports the results from the SMM estimations of our model on the subsamples of large and small firms. Panel A reports the actual and simulated moments, as well as the t-statistics for the differences between the data and the model generated moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

	Large Firms			Small Firms		
Moment	Data	Model	t-stat	Data	Model	t-stat
Autocorrelation of Profitability	0.8262	0.8068	0.6625	0.8130	0.8120	0.0269
Mean Intercept	0.0017	0.0017	0.0323	-0.0000	0.0001	-0.2191
Variance of Residuals	0.0013	0.0014	-0.7178	0.0054	0.0054	0.0240
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0080	0.0092	-1.9192	0.0452	0.0411	0.8924
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.0498	0.0435	1.6309	0.1798	0.1808	-0.0822
Forced Turnover Rate	0.0265	0.0269	-0.3983	0.0310	0.0316	-0.5308
Plan Adoption Rate	0.0978	0.0951	1.4697	0.0697	0.0683	0.7704
Plan Usage Rate	0.8359	0.8360	-0.1967	0.7379	0.7378	0.0706
Mean Profitability 2 Years Before a Forced Turnover	0.0055	0.0001	1.5244	-0.0114	-0.0153	0.6118
Mean Profitability 1 Year Before a Forced Turnover	-0.0027	-0.0001	-0.6782	-0.0291	-0.0186	-1.5177
Mean Profitability in the Year of a Forced Turnover	-0.0178	-0.0103	-1.6021	-0.0575	-0.0392	-2.1770
Mean Profitability 1 Year After a Forced Turnover	-0.0138	-0.0046	-2.0487	-0.0498	-0.0306	-2.4938
Mean Profitability 2 Years After a Forced Turnover	-0.0052	-0.0003	-1.2688	-0.0486	-0.0232	-3.2294
Mean Profitability 2 Years Before a Forced Turnover with a Plan	0.0090	-0.0001	1.9421	0.0020	-0.0147	1.9016
Mean Profitability 1 Year Before a Forced Turnover with a Plan	0.0012	-0.0002	0.2860	-0.0130	-0.0167	0.3972
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0125	-0.0096	-0.5056	-0.0335	-0.0362	0.2400
Mean Profitability 1 Year After a Forced Turnover with a Plan	-0.0090	-0.0041	-0.8401	-0.0260	-0.0271	0.0961
Mean Profitability 2 Years After a Forced Turnover with a Plan	-0.0036	0.0002	-0.6877	-0.0180	-0.0205	0.2216
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0072	0.0052	0.2780	0.0142	-0.0106	2.2651
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	0.0019	0.0050	-0.4405	-0.0187	-0.0154	-0.1416
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0021	-0.0063	0.4707	-0.0261	-0.0343	0.4454
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0070	-0.0091	0.5710	-0.0251	-0.0197	-0.6397
Mean Profitability in the Year of a Plan Adoption	0.0120	0.0035	3.6649	0.0094	0.0006	1.9958
Coefficient of Forced Turnover on Lagged Profitability	-0.0874	-0.0683	-1.5308	-0.0476	-0.0383	-2.2164
Coefficient of Plan Adoption on Lagged Profitability	-0.0705	-0.0776	1.4763	-0.0221	-0.0239	1.5876

Panel B: Parameters

	μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
Large Firms												
	0.0141	0.0168	0.2028	0.0398	0.0204	0.0625	0.0272	0.0215	0.6823	0.0248	0.0287	0.0003
	(0.0027)	(0.0002)	(0.0092)	(0.0013)	(0.0011)	(0.0050)	(0.0015)	(0.0034)	(0.0282)	(0.0041)	(0.0051)	(0.0001)
Small Firms												
	0.0138	0.0265	0.1795	0.0798	0.0206	0.0515	0.0476	0.0573	0.2820	0.0317	0.0189	0.0209
	(0.0039)	(0.0019)	(0.0151)	(0.0016)	(0.0017)	(0.0120)	(0.0072)	(0.0088)	(0.0240)	(0.0027)	(0.0044)	(0.0035)

Table B.4: SMM Results on Firms with Large and Small Boards

This table reports the results from the SMM estimations of our model on the subsamples of firms with large and small boards. Panel A reports the actual and simulated moments, as well as the t-statistics for the differences between the data and the model generated moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

Moment	Large Board Firms Data	Large Board Firms Model	Large Board Firms t-stat	Small Board Firms Data	Small Board Firms Model	Small Board Firms t-stat
Autocorrelation of Profitability	0.8872	0.8720	0.2575	0.7436	0.7392	0.0879
Mean Intercept	0.0016	0.0015	0.1571	0.0022	0.0021	0.0597
Variance of Residuals	0.0012	0.0013	-1.0436	0.0041	0.0043	-0.5379
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0182	0.0200	-0.8687	0.0155	0.0166	-0.5196
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.1059	0.0974	0.6141	0.0731	0.0733	-0.0448
Forced Turnover Rate	0.0239	0.0245	-0.5439	0.0282	0.0276	0.4149
Plan Adoption Rate	0.1069	0.0928	6.3520	0.0804	0.0744	2.9607
Plan Usage Rate	0.8579	0.8586	-0.7453	0.7455	0.7453	0.3742
Mean Profitability 2 Years Before a Forced Turnover	0.0096	0.0050	1.0423	-0.0015	-0.0047	0.4727
Mean Profitability 1 Year Before a Forced Turnover	0.0048	0.0031	0.3415	-0.0222	-0.0078	-1.9727
Mean Profitability in the Year of a Forced Turnover	-0.0148	-0.0143	-0.0798	-0.0490	-0.0382	-1.1631
Mean Profitability 1 Year After a Forced Turnover	-0.0089	-0.0062	-0.4434	-0.0389	-0.0211	-2.2281
Mean Profitability 2 Years After a Forced Turnover	-0.0032	-0.0010	-0.3962	-0.0416	-0.0081	-3.9807
Mean Profitability 2 Years Before a Forced Turnover with a Plan	0.0135	0.0050	1.4477	0.0017	-0.0032	0.5928
Mean Profitability 1 Year Before a Forced Turnover with a Plan	0.0115	0.0031	1.3286	-0.0131	-0.0065	-0.7794
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0019	-0.0143	1.6813	-0.0340	-0.0359	0.1886
Mean Profitability 1 Year After a Forced Turnover with a Plan	0.0078	-0.0062	1.6935	-0.0306	-0.0187	-1.4919
Mean Profitability 2 Years After a Forced Turnover with a Plan	0.0090	-0.0010	1.1911	-0.0168	-0.0056	-1.3372
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0106	0.0132	-0.3368	0.0221	0.0111	0.9013
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	0.0050	0.0112	-0.6898	-0.0146	0.0053	-0.7630
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0054	-0.0054	-0.0012	-0.0136	-0.0232	0.4649
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0100	-0.0177	1.6301	-0.0242	-0.0297	0.7725
Mean Profitability in the Year of a Plan Adoption	0.0144	0.0110	1.1997	0.0076	0.0075	0.0392
Coefficient of Forced Turnover on Lagged Profitability	-0.0621	-0.0596	-0.2427	-0.0453	-0.0489	0.7046
Coefficient of Plan Adoption on Lagged Profitability	-0.0966	-0.1082	1.1237	-0.0664	-0.0707	0.8109

Panel B: Parameters

	μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
Large Boards Firms												
	0.0233	0.0289	0.1348	0.0385	0.0322	0.0456	0.0396	0.0240	0.5227	0.0170	0.0356	0.0013
	(0.0035)	(0.0008)	(0.0076)	(0.0015)	(0.0017)	(0.0087)	(0.0034)	(0.0017)	(0.0543)	(0.0023)	(0.0032)	(0.0007)
Small Board Firms												
	0.0191	0.0256	0.2570	0.0706	0.0377	0.0482	0.0471	0.0305	0.2473	0.0309	0.0282	0.0194
	(0.0048)	(0.0017)	(0.0113)	(0.0017)	(0.0047)	(0.0070)	(0.0113)	(0.0026)	(0.0337)	(0.0023)	(0.0027)	(0.0054)

Table B.5: SMM Results on Firms with Many and Few Independent Directors

This table reports the results from the SMM estimations of our model on the subsamples of firms with many and few independent directors. Panel A reports the actual and simulated moments, as well as the t-statistics for the differences between the data and the model generated moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

	Firms with Many Independents			Firms with Few Independents		
Moment	Data	Model	t-stat	Data	Model	t-stat
Autocorrelation of Profitability	0.9128	0.9005	0.2116	0.7409	0.7361	0.0951
Mean Intercept	0.0010	0.0009	0.2496	0.0023	0.0024	-0.0920
Variance of Residuals	0.0012	0.0013	-1.1051	0.0041	0.0042	-0.1445
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0288	0.0325	-1.1278	0.0154	0.0163	-0.4568
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.1766	0.1685	0.3780	0.0713	0.0713	-0.0086
Forced Turnover Rate	0.0246	0.0261	-1.4429	0.0283	0.0273	0.7448
Plan Adoption Rate	0.1057	0.0848	9.8512	0.0782	0.0759	1.1471
Plan Usage Rate	0.8381	0.8402	-2.2422	0.7524	0.7522	0.3410
Mean Profitability 2 Years Before a Forced Turnover	0.0095	0.0110	-0.3459	-0.0009	-0.0035	0.3967
Mean Profitability 1 Year Before a Forced Turnover	0.0034	0.0098	-1.4092	-0.0227	-0.0059	-2.2909
Mean Profitability in the Year of a Forced Turnover	-0.0133	-0.0031	-1.5937	-0.0494	-0.0266	-2.4449
Mean Profitability 1 Year After a Forced Turnover	-0.0049	0.0012	-1.1127	-0.0399	-0.0152	-2.9870
Mean Profitability 2 Years After a Forced Turnover	-0.0008	0.0035	-0.8454	-0.0450	-0.0061	-4.5471
Mean Profitability 2 Years Before a Forced Turnover with a Plan	0.0113	0.0112	0.0239	0.0089	-0.0031	1.5703
Mean Profitability 1 Year Before a Forced Turnover with a Plan	0.0060	0.0101	-0.7579	-0.0109	-0.0054	-0.6566
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0083	-0.0025	-0.8800	-0.0289	-0.0253	-0.3555
Mean Profitability 1 Year After a Forced Turnover with a Plan	-0.0006	0.0017	-0.3003	-0.0225	-0.0136	-1.0427
Mean Profitability 2 Years After a Forced Turnover with a Plan	0.0038	0.0040	-0.0363	-0.0178	-0.0048	-1.4421
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0118	0.0183	-0.9027	0.0202	0.0021	1.4646
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	0.0029	0.0166	-1.8199	-0.0137	0.0009	-0.5573
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0081	0.0037	-1.4125	-0.0083	-0.0190	0.5207
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0126	-0.0124	-0.0429	-0.0172	-0.0187	0.1894
Mean Profitability in the Year of a Plan Adoption	0.0148	0.0136	0.4100	0.0105	0.0063	0.9863
Coefficient of Forced Turnover on Lagged Profitability	-0.0828	-0.0234	-4.5451	-0.0476	-0.0452	-0.4504
Coefficient of Plan Adoption on Lagged Profitability	-0.0510	-0.0600	1.6149	-0.0603	-0.0630	0.6599

Panel B: Parameters

μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
Firms with Many Independents											
0.0296	0.0195	0.1070	0.0384	0.0218	0.0270	0.0310	0.0287	0.4440	0.0214	0.0299	0.0172
(0.0022)	(0.0019)	(0.0046)	(0.0013)	(0.0015)	(0.0027)	(0.0036)	(0.0041)	(0.0452)	(0.0008)	(0.0135)	(0.0023)
Firms with Few Independents											
0.0150	0.0203	0.2689	0.0703	0.0275	0.0529	0.0436	0.0257	0.4372	0.0241	0.0392	0.0160
(0.0024)	(0.0019)	(0.0067)	(0.0016)	(0.0034)	(0.0057)	(0.0036)	(0.0029)	(0.0386)	(0.0024)	(0.0056)	(0.0019)

Table B.6: SMM Results on Firms with High and Low Institutional Ownership

This table reports the results from the SMM estimations of our model on the subsamples of firms with high and low institutional ownership. Panel A reports the actual and simulated moments, as well as the t-statistics for the differences between the data and the model generated moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

	High Institutional Ownership Firms			Low Institutional Ownership Firms		
Moment	Data	Model	t-stat	Data	Model	t-stat
Autocorrelation of Profitability	0.8626	0.8662	-0.0993	0.7340	0.7303	0.0673
Mean Intercept	0.0028	0.0028	0.1501	-0.0012	-0.0009	-0.3363
Variance of Residuals	0.0026	0.0025	0.9543	0.0034	0.0037	-0.7555
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0319	0.0346	-0.7602	0.0128	0.0136	-0.5277
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.1626	0.1633	-0.0600	0.0582	0.0583	-0.0142
Forced Turnover Rate	0.0275	0.0322	-4.2027	0.0266	0.0271	-0.4004
Plan Adoption Rate	0.0890	0.0847	2.1656	0.0804	0.0717	4.3594
Plan Usage Rate	0.8000	0.8001	-0.1375	0.8396	0.8403	-1.1453
Mean Profitability 2 Years Before a Forced Turnover	0.0208	0.0113	1.9896	-0.0258	-0.0156	-1.6168
Mean Profitability 1 Year Before a Forced Turnover	0.0088	0.0081	0.1562	-0.0358	-0.0176	-2.7712
Mean Profitability in the Year of a Forced Turnover	-0.0089	-0.0094	0.0741	-0.0628	-0.0407	-2.6398
Mean Profitability 1 Year After a Forced Turnover	-0.0032	0.0008	-0.7061	-0.0581	-0.0300	-3.5978
Mean Profitability 2 Years After a Forced Turnover	0.0046	0.0095	-0.9552	-0.0527	-0.0220	-3.7566
Mean Profitability 2 Years Before a Forced Turnover with a Plan	0.0153	0.0113	0.7536	-0.0056	-0.0139	1.0277
Mean Profitability 1 Year Before a Forced Turnover with a Plan	0.0080	0.0081	-0.0063	-0.0191	-0.0160	-0.3907
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0054	-0.0094	0.5547	-0.0329	-0.0374	0.5097
Mean Profitability 1 Year After a Forced Turnover with a Plan	-0.0014	0.0008	-0.2880	-0.0228	-0.0268	0.4514
Mean Profitability 2 Years After a Forced Turnover with a Plan	0.0019	0.0095	-0.9398	-0.0073	-0.0192	1.5673
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0069	0.0221	-1.5358	0.0084	-0.0097	2.4369
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	0.0050	0.0208	-1.6847	0.0070	-0.0091	1.9995
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0017	0.0029	-0.3601	-0.0088	-0.0294	1.8954
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0114	-0.0172	0.9927	-0.0109	-0.0216	2.5851
Mean Profitability in the Year of a Plan Adoption	0.0207	0.0181	0.8654	0.0011	-0.0050	1.5375
Coefficient of Forced Turnover on Lagged Profitability	-0.0910	-0.0582	-3.0635	-0.0463	-0.0477	0.2108
Coefficient of Plan Adoption on Lagged Profitability	-0.0719	-0.0758	1.0717	-0.0462	-0.0544	2.3591

Panel B: Parameters

μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
High Institutional Ownership Firms											
0.0236	0.0335	0.1472	0.0532	0.0244	0.0398	0.0405	0.0233	0.3745	0.0090	0.0111	0.0077
(0.0024)	(0.0019)	(0.0151)	(0.0013)	(0.0027)	(0.0054)	(0.0030)	(0.0017)	(0.0398)	(0.0019)	(0.0026)	(0.0007)
Low Institutional Ownership Firms											
0.0056	0.0226	0.2652	0.0656	0.0303	0.0732	0.0628	0.0369	0.3922	0.0355	0.0034	0.0334
(0.0024)	(0.0015)	(0.0094)	(0.0016)	(0.0033)	(0.0127)	(0.0044)	(0.0027)	(0.0666)	(0.0032)	(0.0037)	(0.0033)

Table B.7: SMM Results Before and After the SEC Policy Shift

This table reports the results from the SMM estimations of our model on observations before (2001-2009) and after (2010-2018) SEC policy shift. Panel A reports the actual and simulated moments, as well as the t-statistics for the differences between the data and the model generated moments. Panel B reports the parameter estimates with standard errors in parentheses.

Panel A: Moments

	Before the SEC Policy Shift			After the SEC Policy Shift		
Moment	Data	Model	t-stat	Data	Model	t-stat
Autocorrelation of Profitability	0.8163	0.8284	-0.2298	0.7890	0.7894	-0.0094
Mean Intercept	-0.0001	-0.0000	-0.3203	0.0027	0.0028	-0.2740
Variance of Residuals	0.0027	0.0028	-0.8824	0.0029	0.0029	0.0789
Variance of CEO-Specific Persistence-Adjusted Profitability Mean	0.0338	0.0333	0.1782	0.0213	0.0214	-0.0188
Mean of CEO-Specific Persistence-Adjusted Profitability Variance	0.1083	0.1170	-0.6751	0.0758	0.0767	-0.1455
Forced Turnover Rate	0.0291	0.0295	-0.3584	0.0284	0.0279	0.6183
Plan Adoption Rate	0.0818	0.0777	2.0712	0.0976	0.0965	0.5644
Plan Usage Rate	0.7930	0.7929	0.1766	0.7910	0.7908	0.2952
Mean Profitability 2 Years Before a Forced Turnover	-0.0142	-0.0185	0.9868	0.0086	0.0005	1.8203
Mean Profitability 1 Year Before a Forced Turnover	-0.0226	-0.0184	-0.8441	-0.0057	-0.0011	-0.8194
Mean Profitability in the Year of a Forced Turnover	-0.0519	-0.0385	-1.9448	-0.0242	-0.0213	-0.4244
Mean Profitability 1 Year After a Forced Turnover	-0.0500	-0.0287	-3.4119	-0.0171	-0.0088	-1.3940
Mean Profitability 2 Years After a Forced Turnover	-0.0408	-0.0195	-3.4944	-0.0137	0.0006	-2.6676
Mean Profitability 2 Years Before a Forced Turnover with a Plan	-0.0065	-0.0183	1.9042	0.0068	0.0005	1.5057
Mean Profitability 1 Year Before a Forced Turnover with a Plan	-0.0119	-0.0178	0.8720	-0.0013	-0.0010	-0.0500
Mean Profitability in the Year of a Forced Turnover with a Plan	-0.0342	-0.0366	0.3077	-0.0153	-0.0212	0.8503
Mean Profitability 1 Year After a Forced Turnover with a Plan	-0.0360	-0.0264	-0.9693	-0.0118	-0.0088	-0.4834
Mean Profitability 2 Years After a Forced Turnover with a Plan	-0.0148	-0.0169	0.2421	-0.0055	0.0006	-1.0173
Mean Profitability 2 Years Before a Forced Turnover of a Planned CEO	0.0022	-0.0043	0.5504	0.0191	0.0080	1.2448
Mean Profitability 1 Year Before a Forced Turnover of a Planned CEO	0.0060	-0.0045	0.8339	0.0119	0.0060	0.5504
Mean Profitability in the Year of a Forced Turnover of a Planned CEO	-0.0170	-0.0229	0.3587	0.0040	-0.0131	1.1896
Mean Profitability Change in the Year of a Forced Turnover with a Plan Used	-0.0222	-0.0184	-0.6100	-0.0126	-0.0195	1.4568
Mean Profitability in the Year of a Plan Adoption	0.0081	-0.0039	3.7086	0.0132	0.0097	1.2525
Coefficient of Forced Turnover on Lagged Profitability	-0.0507	-0.0598	1.2317	-0.0371	-0.0525	1.8931
Coefficient of Plan Adoption on Lagged Profitability	-0.0539	-0.0669	2.6660	-0.1193	-0.1135	-0.3083

Panel B: Parameters

μ_0	σ_0	ϕ	σ_ε	c^{firm}	$\frac{c_f^{board}}{\kappa}$	$\frac{c_a^{board}}{\kappa}$	σ_w	χ	λ_f	λ_u	λ_a
Before the SEC Policy Shift											
0.0081	0.0311	0.1800	0.0587	0.0257	0.0574	0.0400	0.0409	0.3283	0.0312	0.0049	0.0154
(0.0036)	(0.0035)	(0.0107)	(0.0013)	(0.0037)	(0.0078)	(0.0063)	(0.0081)	(0.0604)	(0.0042)	(0.0034)	(0.0028)
After the SEC Policy Shift											
0.0153	0.0266	0.2158	0.0588	0.0270	0.0735	0.0182	0.0239	0.4203	0.0186	0.0166	0.0187
(0.0028)	(0.0016)	(0.0059)	(0.0014)	(0.0029)	(0.0117)	(0.0038)	(0.0022)	(0.0935)	(0.0030)	(0.0051)	(0.0031)

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