The Bright Side of Nepotism? Family CEOs, Turnover, and Firm Performance[1]

Barton H. Hamilton
Olin Business School, Washington University in St. Louis

Andrés Hincapié
University of North Carolina at Chapel Hill

Noah Lyman
University of North Carolina at Chapel Hill

ABSTRACT: Hiring family CEOs is often equated to trading merit for preferences. However, indirect effects from hiring family can counterbalance this direct, negative effect on firm performance. To explore this ambiguity, we estimate a dynamic model of CEO turnover where executive candidates can be found in the family, within the firm, or outside. Firms learn about the quality of all hires from firm performance and are better informed about internal candidates. While we find firms do prefer family executives, a counterfactual prohibition of family hires decreases firm profits, indicating that among publicly-traded US firms the indirect benefits from family preferences dominate.

KEYWORDS: CEO Turnover, Family Firms, Firm Performance, Corporate Governance, Learning.
JEL CLASSIFICATION: G32, L25, M51.

[1]First version: March 23, 2020. This version: October 17, 2023. We thank Simone Hanna and Alejandro Gutiérrez-Li for expert research assistance and Luca Flabbi, Brian McManus and Peter Arcidiacono for helpful comments. We are also grateful to audiences of seminars at the University of North Carolina at Chapel Hill, Washington University in St. Louis, CREED conference at the College of Charleston, and DITE conference at Duke for valuable comments and feedback.

1 Introduction

CEOs are important determinants of firm performance (Bennedsen et al., 2020; Bertrand and Schoar, 2003). While several authors have found their contribution to be negatively affected by their familial relationship to the firm (Smith and Amoako-Adu, 1999; Bennedsen et al., 2007; Bertrand et al., 2008), family CEOs continue to be hired and are three times less likely to be fired than outsider CEOs. A reason often suggested for this seeming contradiction is that family CEO appointments may be due less to merit and more to preferences such as the pleasure of passing the business onto the next generation (Peréz-González, 2006). However, there might be a bright side to family preferences as they can translate into boards of directors being more selective when hiring and firing other types of CEOs. Moreover, boards likely possess more information about the quality of family executive candidates, allowing them to better select at the hiring margin. Given that CEO replacement decisions have major consequences for firm performance (Weisbach, 1988; Parrino, 1997; Murphy, 1999; Peters and Wagner, 2014; Jenter and Kanaan, 2015) it is important that we address the ambiguity empirically. After all, depending on which forces dominate, blanket management strategies that prevent family hires can do more harm than good to firm profitability.

In this paper we assess the impact of nepotism on firm performance and personnel decisions. We estimate a dynamic model in which a firm's board of directors chooses to hire, retain, or fire their CEO in order to maximize the discounted expected future stream of profits plus non-financial factors, such as the non-pecuniary cost of firing the CEO (Taylor, 2010). The board is uncertain of the firm-specific quality of CEO candidates at the hiring stage, and later updates their prior beliefs by observing firm performance. Based on their updated beliefs about the executive's contributions to firm performance (as well as non-pecuniary factors), the board then decides whether to continue employing their CEO. We incorporate the potential for nepotism into the board's CEO hiring and retention decisions in the following ways. First, the board chooses the CEO from one of three pools of executive candidates: (a) an external pool (*outsider* candidates); (b) a pool of pre-existing (unrelated) company employees (*insider* candidates); and, if available, (c) individuals with familial ties to the firm (*related* candidates).[2] The board has different prior beliefs regarding the quality of candidates from each pool because the distribution of ability varies across pools. The board may also have additional information on the quality of insider and related candidates, due to their prior employment at the firm or relationship with management Hermalin (2005).[3] Second, we specify the board's preferences to include a non-pecuniary benefit from employing a related CEO, which it incorporates into decisions regarding hiring, retention, and termination.

[2]We use the terms family CEO and related CEO interchangeably in the rest of the paper. As described below, we do not assume that the firm is always able to hire a related candidate. We capture this limited supply in our model.

[3]Quigley et al. (2019) find that the variance of firm performance is significantly higher for outsider CEOs.

While our model allows us to assess the potential negative impact of nepotism on firm performance that receives much of the attention in the literature, it also uncovers mechanisms through which nepotism may be beneficial. By allowing the CEO quality distribution to vary by type and boards to have preferences for related candidates, we capture the tradeoff between merit and preferences that is commonly hypothesized. Our parsimonious framework also captures an array of mechanisms through which nepotism may foster firm performance. First, family members, when available, provide an additional source of talent that firms may not be able to access otherwise. In the absence of family preferences this expansion of the talent pool mechanically improves performance. Second, at the hiring margin, preference for related candidates increases the opportunity cost of hiring non-family CEOs, raising the expected quality of insider and outsider hires. Third, at the firing margin, the availability of related candidates increases the cost to the board of retaining an insider or outsider CEO. Finally, nepotism may help offset some of the negative effects of CEO entrenchment discussed in (Taylor, 2010), since poorly performing insider and outsider executives will be fired more quickly if a related candidate is waiting in the wings.

Throughout the paper, we distinguish between family *management* and family *ownership*; the latter has been shown to be consequential for firm outcomes (Anderson and Reeb, 2003, 2004; Villalonga and Amit, 2006; Morck et al., 1988). A firm is family-managed if it has a related CEO, in other words, an executive with familial ties to the firm. A firm is family-owned, or more precisely family-controlled, if the founding family owns at least 25 percent of outstanding shares.[4] As discussed in Villalonga and Amit (2008), family-owned firms frequently use control-enhancing mechanisms including dual-class share structures, disproportionate family representation on the board, and voting agreements to strengthen family control. Along with the substantial involvement of family members in firm operations, these mechanisms increase the likelihood of family hires. Conditional on turnover, family-controlled firms in our sample are eleven percentage points more likely to hire a related CEO than non-family-controlled firms. To capture these factors, we allow the preferences for employing a related CEO to be different for family-controlled and non-family-controlled firms.[5]

We estimate the model using simulated method of moments and panel data from publicly traded North American firms spanning from 1996 to 2014. Firm-level data are obtained from Compustat and executive-level data from Execucomp. We use Security and Exchange Commission DEF14 filings to identify CEOs with blood or marital ties to high-level firm personnel and complement

[4]This threshold varies across the family firm literature. Claessens et al. (2000) classify a firm as family-owned if the founding family owns $\geq 5\%$ of shares, Barth et al. (2005) use 33%, and Ang et al. (2000) use 50%. We use the same ownership data as Lins et al. (2013) and Ellul et al. (2017), and hence follow their threshold choice of 25%.

[5]Note that even if a firm is not majority family-owned, they can still appoint a related CEO. For example, Anheuser-Busch is not majority family-owned but it employed a related CEO for six of the eleven years it is present in our sample. Conversely, a family-owned firm need not employ a related CEO. Walmart, while family-owned, does not employ a related CEO at any point during our sample period.

these data with Internet searches. Family ownership is determined using the Osiris Ownership database. Since our focus is on firing and hiring decisions made by the firm, we separate cases of CEO turnover as forced or voluntary using data provided by Peters and Wagner (2014) and Jenter and Kanaan (2015).

We find that the CEO has a substantial impact on firm performance and that boards do have preferences for employing family. For the median firm, the estimated variance in the quality of CEO candidates indicates that a high-quality executive (90th percentile) generates approximately $61.2 million more in average profits than a low-quality hire (10th percentile). Despite this variation, the forced turnover rate in our sample is fairly low, as only 2.8 percent of outsider CEOs and 2.1 percent of insider CEOs are fired in a given year.[6] Forced turnover is even less common for related CEOs, with only 0.9 percent fired each year. This gap in firing probabilities, which persists even after controlling for CEO performance, reflects a preference for employing family. Our estimates indicate that family-controlled (non-family-controlled) firms enjoy a non-pecuniary benefit of employing a related CEO worth approximately $70 million ($6 million). The strong preference for hiring family members explains why family-controlled firms are twice as likely to employ a related CEO than other firms. The additional gap in forced turnover between related and outsider executives reflects a higher degree of uncertainty when hiring from the outsider pool. Given the higher variance of the outsider distribution of quality, firms are at a higher risk of unwittingly hiring low-quality outsiders, a result also found in Hermalin (2005). Consequently, they are also more likely to fire their outsider executives.

Our main results show that, surprisingly, nepotism does not reduce firm profits. Using our data and model estimates, we conduct a counterfactual experiment showing that an anti-nepotism policy prohibiting the hiring of related CEOs *reduces* the average firm's net present value of profits by approximately $60 million over an 18 year period.[7] This reflects the operation of conflicting mechanisms. The negative effect of nepotism is straightforward: for a median-sized firm, the average related CEO candidate generates approximately $5.2 million less in average profit than the average quality insider candidate. Despite this quality gap, our estimates of the preferences for employing related executives indicates that boards may still choose to hire and retain lower quality family members over unrelated insiders.

How then does nepotism benefit the firm? We demonstrate that family members provide a valuable source of executive talent that more than offsets the negative effects of the board's preference for a related CEO. First, for a median-sized firm, an outsider candidate of average quality generates $11.3 million less in average profits than the average related candidate. Second, prior

[6] See for example: Huson et al. (2001), Taylor (2010), Kaplan and Minton (2012).

[7] We calculate the change in net present value of profits over an 18 year period following the hiring of a CEO to incorporate the impact on both returns and turnover costs.

information on CEO quality is valuable. The board of directors faces 56 and 67 percent less uncertainty when hiring related and insider CEOs, respectively, so that these hires tend to be of higher quality.[8] Third, board preference for a related CEO increases the opportunity cost of employing an insider or outsider. An anti-nepotism mandate thus induces the board to be less selective at both the hiring and firing stages, reducing average CEO quality. For example, forced turnover declines when the firm is not allowed to consider related candidates. As a result, under the anti-nepotism mandate the tenure of low ability insider and outsider CEOs (those at the bottom 10th percentile of the quality distribution) increases from 7.6 to 9.2 years and from 8.3 to 9.3 years, respectively. We find that these benefits dominate so that banning the hiring of related candidates reduces firm profitability.[9]

Like much of the literature, we find CEOs to be strongly entrenched and that entrenchment is costly. The non-pecuniary costs of ousting a CEO are high: $183.6 million for the median firm. When these turnover costs are set to zero in our simulations (and there is no preference for hiring family members), the annual forced turnover rate increases from 4.9 to 19.2 percent (2.5 to 9.4 percent) for outsider (insider) CEOs. As a result, the net present value of the median firm's profits over 18 years increases by at least $1.4 billion. Notably, nepotism may reduce the effective cost of entrenchment. Our counterfactual simulation eliminating the preference for employing related candidates shows a reduction in forced turnover among insider and outsider CEOs at family-controlled firms by 1.3 and 1.0 percentage points, respectively. The enhanced CEO entrenchment arising from the absence of family preferences thus costs the family firm an additional $32 million in net present value.

Our paper contributes to the growing literature using dynamic structural models of CEO hiring and retention to analyze the impact of alternative personnel policies on firm outcomes. The papers most similar to ours are Taylor (2010) and Lippi and Schivardi (2014). Taylor (2010) estimates a dynamic model of CEO turnover in which firms face uncertainty about CEO quality which is gradually revealed by firm performance. Firms can replace their CEO at a cost of replacement estimated to be over $200 million for a median-sized firm. Crucially, most of this cost can be attributed not to monetary costs but to a distaste for firing executives, which induces CEO entrenchment and pushes boards away from profit-maximizing behavior. Lippi and Schivardi (2014) estimate a model of executive selection allowing firms to have non-pecuniary preferences for hiring CEOs who have personal relationships with firm personnel. Using data on Italian firms, they find that

[8] This is consistent with Quigley et al. (2019) who consider outsiders to be a riskier lottery than internal hires. Note that in our model, outsiders will be hired when the board gets particularly bad initial signals of insider and related candidate quality.

[9] We do not argue that nepotism is a net positive in any and all environments. Rather, we argue that given the level of preference for family executives in publicly traded firms, the benefits of nepotism outweigh the costs. Should certain types of firms have stronger preferences for family, as it might be the case for privately own firms, then the negative effects of nepotism might dominate.

these preferences have a detrimental impact on firm performance. Their result points at the direct effect of nepotism: firms sacrifice performance in exchange for the non-pecuniary benefits gained from employing family. While we capture the mechanisms suggested in both papers, we extend the framework to explore the implications of nepotism and its interaction with CEO entrenchment. For example, we incorporate and expand the information structure presented in Hermalin (2005) and Taylor (2010) which allows us to capture indirect effects of nepotism reflected in hiring and termination decisions. Such indirect effects include the upward pressure that the pool of related candidates exercises on the hiring threshold for insider CEOs and on the firing threshold for both outsider and insider executives. Other recent papers using similar approaches are Lyman (2023) who studies the impact of entrenchment on dynamic managerial incentives and Ferraro (2021) who studies the impact of news coverage on female leadership.

The remainder of the paper proceeds as follows. Section 2 presents the data and discusses key empirical patterns that support our question and modeling choices. Section 3 outlines our dynamic model of CEO selection. Section 4 discusses identification and our estimation procedure. Section 5 presents the structural estimates and Section 6 presents counterfactual results. We discuss and conclude in Section 7.

2 Data

We use a panel of publicly traded North American firms spanning from 1996 to 2014. To construct the panel we merge firm information from databases Compustat, Osiris Ownership, and Execucomp.[10] Compustat provides information regarding firm fundamentals including balance sheet and income statement items. With this information we construct the return on assets (ROA).[11] Our final measure of firm performance corresponds to the industry-adjusted ROA (IA-ROA), which is the ROA net of an industry-specific time trend.[12] Osiris Ownership provides information regarding the firm's ownership. Using the information in Osiris we classify firms in our sample as family-controlled (FC) firms or non-family-controlled (NFC) firms.[13] Following previous literature (Lins et al., 2013; Ellul et al., 2017), we define family-controlled firms as those in which a

[10] All three sources are accessible through the Wharton Research Data Services.

[11] ROA is commonly used in the literature as a measure of firm performance (Peréz-González, 2006; Bertrand et al., 2008; Taylor, 2010). It is calculated by dividing the earnings before interest and taxes (variable $oibdp$ in Compustat) in year t by the midpoint of total assets in t and $t-1$.

[12] The IA-ROA is defined as:

$$IA\text{-}ROA_{it} \equiv ROA_{it} - \alpha_{it}^{ind} \tag{1}$$

where α_{it}^{ind} is an industry-specific time trend. We consider 9 industries as determined by the first digit of a firm's Standard Industry Classification (SIC) code. See details in Appendix A.1.

[13] See for example: Anderson and Reeb (2003), Anderson and Reeb (2004), Villalonga and Amit (2006), Morck et al. (1988).

single individual or a group of relatives holds at least 25 percent of the shares. We merge this ownership classification with our main sample via text matching using both the firm's stock ticker and name. (See Appendix A.1.) Our classification yields 113 FC firms representing 4.3 percent of all firms in the sample. This share of FC firms is consistent with the one found in other Western countries (Lins et al., 2013). Execucomp provides information regarding the firm's CEO including tenure, demographic information, the length of prior employment at the firm (prior to becoming CEO), and turnover. These data sets are supplemented with data provided by Florian Peters (University of Amsterdam) who classifies cases of CEO turnover in Execucomp as forced or voluntary following the methodology outlined in Parrino (1997).

We classify CEOs according to their prior work-related or familial relation to the firm. For prior work-related relations we use Execucomp; for familial relations we rely mainly on Definitive Proxy Statements (DEF 14A) filed with the Security and Exchange Commission, which we supplemented with Internet searches.[14] *Outsider* CEOs are those with less than two years of experience at the firm when appointed, who have no familial relation to upper management (board members, previous CEOs, founders). *Insider* CEOs are those with more than two years of experience at the firm when appointed, who have no familial relation to upper management. *Related* CEOs are those with familial relations to upper management.[15] (See Appendix A.1 for more details about how the data set is constructed.)

Our final sample contains 24,689 observations with 2,616 unique firms and 4,365 distinct CEO spells corresponding to 4,278 unique CEOs.[16] Of the 4,365 CEO spells in the sample, 1,813 (41.5%) are outsiders, 2,157 (49.4%) are insiders, and 395 (9.1%) are related. The sample contains 2,038 instances of turnover, 540 (26.5%) of which are classified as forced while 1,498 (73.5%) are classified as voluntary. The median CEO tenure is six years, with an average of 8.1 years and a standard deviation of 7.02 years.

2.1 Key Empirical Patterns

In this section we present empirical evidence that motivates our research question and model selection. The data show that performance has a large impact on CEO turnover and that firms with internal CEOs have higher mean and lower variance in performance. The data also reveal that the average of unexplained firm performance increases with tenure while the variance declines. Fi-

[14]The DEF 14A includes details on items to be voted on at an upcoming shareholder meeting, board composition, and conflicts of interest among directors such as family ties between board members and other personnel at the firm.

[15]We do not split related CEOs into insiders and outsiders; in the data only 8.4% of related CEOs have less than two years of experience at the firm when appointed.

[16]The small difference between unique CEOs and distinct CEO spells is due to a very small minority of executives with CEO spells at more than one firm. Following Peréz-González (2006) we drop from the sample CEOs who only last one year (5.2% of hires) as their turnover is likely deterministic and due to interim arrangements.

nally, we show that firms are less likely to fire related CEOs and that FC firms are more likely to appoint them.

Residual firm performance and familial relation to the firm have a large impact on forced turnover. We first explore whether firms respond to underwhelming CEO performance by replacing their executives. In order to separate, in reduced form, CEO performance from persistence in productivity, we estimate an AR(1) process of industry-adjusted ROA and construct a proxy for the firm's information about the quality of the match using the cumulative residuals of the AR(1) process. Formally, we define the cumulative residuals of CEO j in firm i and time t as:

$$\hat{\theta}_{jit} \equiv \frac{1}{t - t_{ji} + 1} \sum_{\tau=t_{ji}}^{t} (y_{ji\tau} - \hat{\upsilon} y_{ji\tau-1}) \tag{2}$$

where y_{jit} is the IA-ROA, $\hat{\upsilon}$ is the estimate of productivity persistence from the AR(1) process, and t_{ji} is the beginning of CEO j's tenure at firm i. The variable $\hat{\theta}_{jit}$ captures the cumulative unexplained variation in profitability.[17] A high value of $\hat{\theta}_{jit}$ indicates a favorable performance during the executive's tenure, while a low value suggests the opposite.

Table 1 shows the marginal effect of $\hat{\theta}_{jit}$ on turnover using multinomial regression and controlling for CEO and firm characteristics. The cumulative performance residual has a negative and statistically significant effect on forced turnover. An increase of one standard deviation in $\hat{\theta}_{jit}$ decreases the probability of forced turnover by 0.4 percentage points (3.84×0.115) from a baseline probability of 3.1 percent, suggesting that firms are likely to integrate CEO performance in their turnover decisions. Insiders and related CEOs are significantly less likely to be forced out than outsiders, although the effect is larger for related executives. While insider CEOs are 0.8 percentage points less likely to be fired, related CEOs are 1.9 percentage points less likely to be fired, about two thirds of the baseline probability of forced turnover. Regarding voluntary turnover, the cumulative performance residual has no statistically significant effect, revealing a weaker relation between performance and voluntary separation. CEO type does have a significant effect on voluntary turnover. Related CEOs are 3.1 percentage points less likely to voluntarily step down from a baseline probability of 6.7 percent. We also find that tenure and age decrease the likelihood of forced turnover and increase the likelihood of voluntary separation.

Firms with related and insider CEOs have higher mean and lower variance in performance. Panel A in Table 2 shows that on average firms with insider or related CEOs have higher return on assets than those with outsider CEOs. In addition, the variance of ROA is higher in firms

[17] Cumulative residuals have been used previously in the literature to explore whether changes in information about occupational ability are associated with changes between entrepreneurship and paid employment (Hincapié, 2020).

TABLE 1: Marginals of Forced and Voluntary Turnover

	Forced		Voluntary	
	Baseline: 3.1%		*Baseline*: 6.7%	
	$\frac{\partial p}{\partial x}(\%)$	SE	$\frac{\partial p}{\partial x}(\%)$	SE
Cumulative performance residuals, $\hat{\theta}_{ijt}$	-.115***	(.030)	.029	(.054)
CEO characteristics				
Age	-.140***	(.029)	.783***	(.049)
Tenure	-.110***	(.032)	.087**	(.043)
Insider	-.829***	(.258)	.116	(.403)
Related	-1.94***	(.319)	-3.05***	(.477)
Firm type				
Family-controlled	-.288	(.670)	-.971	(.791)
Observations	17,979			

Notes: Marginal effects from a multinomial logit regression with the mutually exclusive alternatives being: retaining the CEO, forced turnover, and voluntary turnover. *Columns*: $\partial p/\partial x$ are the marginal changes in probability in percentage points; *SE* are the standard errors of the marginal effects; *, **, and *** denote significance at the 10% level, 5% level, and 1% level, respectively. *Rows*: *Cumulative performance residuals*, defined in equation (2), are a proxy for the current belief about the quality of the firm-CEO match; the base category for CEO type is *outsider*. The baseline point at which the derivatives are evaluated is the mean of the continuous variables and zeros for all binary variables. The value of the derivative for binary variables is the change in probability from a unit change. *Baseline* are the probabilities of forced and voluntary turnover evaluated at the baseline point.

with outsider CEOs. Table 2 also shows that the patterns in the raw data, which are consistent with Quigley et al. (2019), remain after adjusting the ROA by industry. Hermalin (2005) argues that these results may be explained by higher variance in the match quality of outsider executive candidates.

To explore these results further we approximate the quality of firm-CEO matches using the cumulative performance residual defined in (2). Our best reduced-form approximation of the quality of the match is the cumulative performance residual at the last year of the CEO's tenure at the firm. Panel B in Table 2 shows that firms employing insider and related CEOs have on average higher residual performance than those employing outsiders. Put in dollar terms, firms with insider and related CEOs have an average residual return on assets of $38 and $273 per thousand dollars in assets, respectively. The average residual return on assets for firms with outsiders executives is -$388 per thousand dollars in assets. Besides, the unexplained performance residual under insider and related CEOs is more concentrated. The variance of performance residuals for outsiders is over twice that of related and insider CEOs.

TABLE 2: Summary Statistics by CEO Type

Panel A: Firm-Year Descriptives

	Outsiders		Insiders			Related		
	Mean	SD	Mean	SD	Δ	Mean	SD	Δ
ROA	12.1	(12.8)	13.9	(10.9)	1.86***	13.6	(11.7)	1.54***
IA-ROA	-1.18	(12.5)	.904	(10.1)	2.09***	.035	(11.1)	1.22***
Assets ($ billions)	14.0	(105.9)	25.1	(128.1)	11.11***	6.77	(22.1)	-7.21***
Observations (Firm-year)	10,066		13,052			3,644		

Panel B: Firm-CEO Descriptives

	Outsiders		Insiders			Related		
	Mean	SD	Mean	SD	Δ	Mean	SD	Δ
Cumulative performance residuals $\hat{\theta}_{ijt}$ at turnover	-.388	(4.64)	.038	(3.24)	.426***	.273	(3.22)	.661***
Observations (Firm-CEO)	1,684		2,019			386		

Notes: ROA is the firm's return on assets, defined as operating income divided by the midpoint of year t and $t-1$ assets. *IA-ROA* is the industry-adjusted ROA, i.e. the ROA net of an industry-specific time trend. Standard deviations (SD) are included in parentheses. Column Δ indicates the difference in means relative to outsiders; *, **, and *** denote significance at the 10% level, 5% level, and 1% level respectively. Assets are in real billion $U.S. indexed to 2012. *Cumulative performance residuals* are defined in equation (2); evaluated at turnover they are a proxy for the most precise belief about the quality of the firm-CEO match.

The average of residual firm performance increases with tenure, its variance declines. Table 3 presents the results from a regression of the cumulative performance residual $\hat{\theta}_{jit}$ on CEO type, tenure, and year fixed effects. Column (1) shows that the cumulative performance residual increases significantly with respect to tenure. This positive selection is consistent with boards of directors who monitor CEO performance and force out executives of poor quality. Column (2) interacts tenure with CEO type, showing that the positive relation between tenure and the cumulative performance residual is attenuated for insider and related CEOs. Consistent with our results above, results here suggest that boards' decisions entail a starker positive selection for outsider CEOs.

To explore further the existence of positive selection, Figure 1 plots the variance of the cumulative performance residual across firm-CEO matches for the first 10 years of tenure. The large variation in cumulative performance residuals at the beginning of a firm-CEO match rapidly decreases over the first ten years of tenure for all types of CEOs. Consistent with positive selection of CEOs over tenure, the results in Table 3 and Figure 1 suggest that the distribution of quality among retained CEOs shifts rightward and becomes more concentrated with tenure.

TABLE 3: Cumulative Performance Residual and CEO Tenure

	(1)		(2)	
	Coefficient	SE	Coefficient	SE
Constant	-.090	(.636)	-.293	(.197)
Tenure	.010***	(.004)	.031***	(.006)
Insider	.389***	(.067)	.642***	(.112)
Related	.128	(.088)	.741***	(.165)
Insider × Tenure			-.029***	(.009)
Related × Tenure			-.049***	(.009)
Observations	17,979		17,979	

Notes: The dependent variable in both columns is the cumulative performance residual $\hat{\theta}_{jit}$. Column 1 estimates the slope of $\hat{\theta}_{jit}$ with respect to tenure, along with level differences in $\hat{\theta}_{jit}$ across CEO type. Column 2 includes interactions of tenure and CEO type. Outsider CEOs are the base group in both columns. *, **, and *** denote significance at the 10% level, 5% level, and 1% level respectively. We include year fixed effects in both regressions.

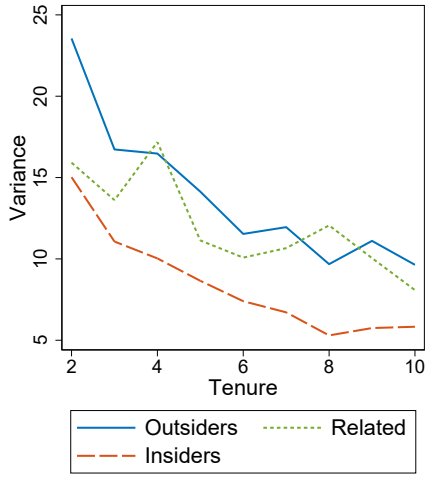
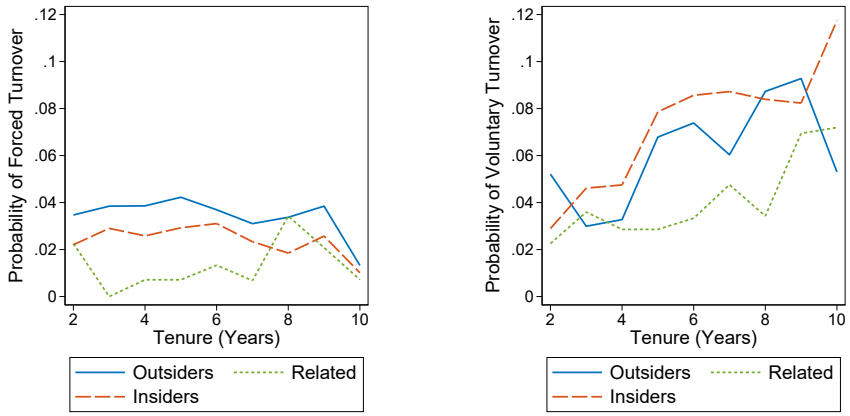


FIGURE 1: Variance of Cumulative Performance Residuals over Tenure
Notes: The cumulative performance residuals are defined in equation (2).

Related CEOs are rarely fired. Figure 2 plots the hazard rates of forced and voluntary turnover by CEO type during the first ten years of CEO tenure.[18] Consistent with Taylor (2010), the level of the hazards in Figure 2(a) shows that CEOs are very unlikely to be forced out across all levels of tenure. The probability of forced turnover is rather flat around four and three percent for outsiders and insiders, respectively, and it bounces between one and two percent for related executives. Figure 2(b) shows that while the likelihood of voluntary turnover steadily increases over tenure for all types of CEOs, related CEOs are generally less likely to step down voluntarily.

The higher likelihood of forced turnover for outsiders is consistent with our previous results in

[18]The hazards start at tenure two following our sample restrictions described above. In particular, following Peréz-González (2006) we dropped one-year CEOs whose appointments are most likely interim.



(a) Forced (b) Voluntary

FIGURE 2: Forced and Voluntary Turnover Hazards

Notes: The hazards start at tenure two following our sample restrictions. In particular, we dropped one-year CEOs whose appointments are most likely interim.

Tables 1 and 2. Figure 3 suggests that those results are compounded with a higher sensitivity to fire based on performance in firms with outsider CEOs. The figure plots the evolution of performance residuals preceding forced turnover. It reveals that the cumulative performance residual persistently declines leading up to forced turnover for outsiders and insiders, especially for outsiders. For related CEOs the trend is rather flat. Forced turnover seems more sensitive to performance for outsiders and less sensitive for related CEOs.

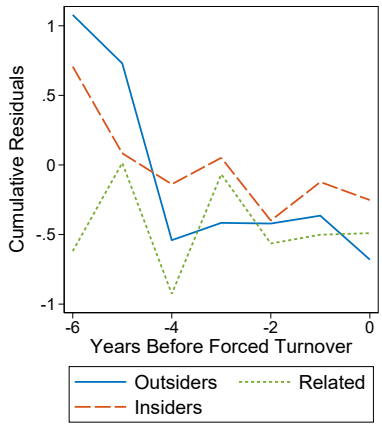


FIGURE 3: Performance Residuals Before Forced Turnover

Notes: This figure averages the cumulative performance residuals (defined in equation (2)) within each CEO type and shows how they trend preceding forced turnover.

Family-controlled firms are more likely to appoint related CEOs. Figure 4 shows the distribution of CEO types in family-controlled and non-family-controlled firms upon turnover. In

both types of firms insiders are the most common hires (above 50%). Moreover, related CEOs are more than three times as likely to be hired in FC firms (15%) than in NFC firms (5%). That related CEOs are preferred in family-controlled firms is perhaps unsurprising since these companies likely display higher involvement of family members in firm operations, which increases the supply of related CEOs candidates. Moreover, conditional on supply, FC firms likely enjoy non-pecuniary benefits from keeping control within the family at the chief executive spot.

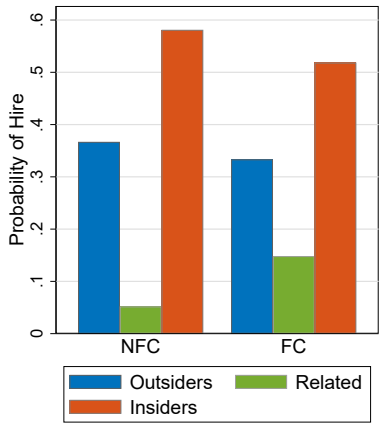


FIGURE 4: Distribution of CEOs Types by Firm Type, Conditional on Turnover
Notes: Firm types are non-family-controlled (NFC) and family-controlled (FC).

3 A Model of CEO Turnover with Nepotism

Motivated by the previous facts we build a structural model of CEO turnover that incorporates preferential treatment for related executives. The model features infinitely lived firms which can be family-controlled or non-family-controlled. Each firm's board of directors makes CEO firing and hiring decisions based on the executive's contribution to firm profits and on non-pecuniary benefits resulting from the CEO's familial ties to the firm. The board learns the match quality of its CEO over the executive's tenure and decides whether to fire them if the beliefs about their quality have deteriorated enough. CEOs can also leave the company voluntarily. Upon turnover, the board hires a replacement from one of three mutually exclusive pools of CEO candidates: outsiders, insiders, and related. Related CEOs have family ties to the firm. Insider CEOs do not have family ties to the firm, but were employees of the company who have ascended to the CEO spot. Outsiders do not have family ties to the firm and were not employees of the company. The firm has more prior information about the quality of insider and related candidates, reflecting previous interactions with them. FC and NFC firms differ in their preferences over related CEO candidates.

3.1 Firms and Executives

Firms are indexed by i and time is indexed by t. CEOs serve in one single firm and drop from the pool of candidates upon turnover.[19] CEOs are indexed by j and have four main traits: age, type (determined by their prior relation to the firm), match quality, and tenure. Let $a_{jit} \in \mathbf{Z}_+$ denote the age of CEO j in firm i at t, and let $m_{ji} \in \{O, I, R\}$ denote their type, which can be outsider ($m_{ji} = O$), insider ($m_{ji} = I$) or related ($m_{ji} = R$). Let $\theta_{ji} \in \mathbf{R}$ denote the match quality of CEO j at firm i, and let $\tau_{jit} \in \mathbf{Z}_+$ denote their tenure as CEO. Both CEO match quality and type remain constant within the executive's spell at the firm. The age and match quality of CEO candidates are random variables with population cumulative distribution functions F_a and $N(\mu_{k\theta}, \sigma^2_\theta)$ for $k \in \{O, I, R\}$, respectively. We allow the means of each match quality distribution to vary by CEO type, while the variance is equal across the three distributions.

Firms are infinitely lived. Their main trait is their type, denoted $\varphi_i \in \{0, 1\}$, which can be either family-controlled ($\varphi_i = 1$) or non-family-controlled ($\varphi_i = 0$). Let $v_{it} \in \{0, 1\}$ and $d^f_{it} \in \{0, 1\}$ be indicators for voluntary turnover (stepping down) and forced turnover (firing), respectively. If a voluntary separation has not happened at the beginning of t ($v_{it} = 0$), the board of directors decides whether to fire their current CEO ($d^f_{it} = 1$) or retain them ($d^f_{it} = 0$). If a voluntary separation has happened ($v_{it} = 1$), or if the CEO was fired, the board decides the new CEO's prior relation, and draws their age and match quality. Firms can always draw an outsider or an insider from their internal talent. Conditional on turnover, related candidates are available with probability p. However, if the previous CEO was related there is an increased supply of related CEO candidates upon turnover captured by the additional probability p_s.[20] Upon turnover, the hiring choice set of firm i at t is denoted $\mathscr{C}_{it} \subseteq \{O, I, R\}$. The firm must choose an executive and can only choose one.

3.2 Profitability and Information Structure

Firm profitability is denoted by Y_{jit} and has three components:

$$Y_{jit} = \iota_{it} + y_{jit} - c(v_{it} + d^f_{it}) \tag{3}$$

where ι_{it} is an exogenous, industry-specific time trend. c is a monetary cost of turnover which reflects severance payments, recruitment costs, management disruptions, and other aspects of CEO turnover impacting profitability. y_{jit} captures the *firm-specific* component of profitability which

[19] In the data only 91 out of 4,428 executives serve as CEO in more than one firm during the sample period.

[20] Hence, the probability of having a related candidate available upon turnover if the previous CEO was related is $p + p_s$. This higher probability can reflect institutional changes undertaken by the prior related CEO such as appointing more family members in upper management.

mean-reverts around the executive's match quality according to:[21]

$$y_{jit} = y_{it-1} + \rho(\theta_{ji} - y_{it-1}) + \eta_{it} \tag{4}$$

where ρ measures the persistence of firm profitability. Firm profitability also depends on an idiosyncratic shock η_{it} distributed $N(0, \sigma_\eta^2)$ independent across firms and periods.[22] Firms do not separately observe their CEO's match quality θ_{ji} from the idiosyncratic shock. Instead they observe the residual profitability $\xi_{jit} \equiv \theta_{jit} + \frac{\eta_{it}}{\rho}$ which they use as a signal to update their beliefs about their executive's match quality.

Let B_{jit} denote the firm's beliefs about the quality of its current CEO j, and let B^0_{kit} denote the prior beliefs the firm has before hiring a CEO candidate from pool $k \in \mathscr{C}_{it}$. Firms have rational expectations. Hence, since the board has no additional previous information regarding outsider candidates, the initial belief for outsiders is the population distribution of quality of outsider CEO candidates. Regarding insider and related candidates, firms do have additional previous information by virtue of their previous professional or familial relations with the candidates. Upon turnover, firms obtain separate initial signals s_{Iit} about the quality of the next insider candidate and s_{Rit} about the next related candidate provided one is available, and update their beliefs using Bayes' Rule. Both signals are independently distributed $N(\theta_{kit}, \sigma_{ks}^2)$ over types of CEOs, time, and firms, where θ_{kit} is the quality of candidate of type k in firm i at time t, and σ_{ks}^2 represents the quality of the additional information. Since the quality of insider and related CEO candidates and the signals are both distributed Normal, the initial beliefs for insider and related candidates are also distributed Normal. Hence, initial beliefs for each type of CEO are given by:

$$B^0_{kit} = \begin{cases} N\left(\mu_{O\theta}, \sigma_\theta^2\right) & \text{if} \quad k = O \\ N\left(\frac{\sigma_{ks}^2 \mu_{k\theta} + \sigma_\theta^2 s_{kit}}{\sigma_{ks}^2 + \sigma_{k\theta}^2}, \frac{\sigma_{ks}^2 \sigma_\theta^2}{\sigma_{ks}^2 + \sigma_\theta^2}\right) & \text{if} \quad k = I, R \end{cases} \tag{5}$$

The prior information received about insider and related candidates will favorably or negatively affect the firm's beliefs. This can be seen in equation (5). The signals change the mean of the distribution for insiders and related. In addition, the extra information decreases uncertainty about related and insider candidates since $\frac{\sigma_{ks}^2 \sigma_\theta^2}{\sigma_{ks}^2 + \sigma_\theta^2} < \sigma_\theta^2$. In response to these changes in beliefs the board of directors will lean in favor of or against hiring outsiders.

In times when CEO turnover does not happen, firms update their beliefs regarding their current

[21] Following Taylor (2010) we omit tenure from the profitability equation. We tested in preliminary OLS and fixed effects regressions whether CEO tenure had an effect on firm profitability controlling for lagged profitability. We could not reject a zero coefficient. (See Table A.1 in Appendix A.2.)

[22] We do not index prior profitability by the index j to capture the fact that the prior CEO may have been different.

CEO j in a similar fashion, using the residual profitability signal ξ_{jit} which is distributed Normal by construction. Since the initial priors for all CEO types are also distributed Normal, the beliefs about the current CEO at any point in time are a Normal distribution which can be characterized by its mean $\tilde{\theta}_{jit}$ and variance $\tilde{\sigma}^2_{jit}$. We use this property to redefine the beliefs regarding the current CEO j as $B_{jit} \equiv [\tilde{\theta}_{jit}, \tilde{\sigma}^2_{jit}]$, where by Bayes' Rule:

$$\tilde{\theta}_{jit+1} = \frac{\sigma^2_\eta \tilde{\theta}_{jit} + \tilde{\sigma}^2_{jit} \xi_{jit}}{\sigma^2_\eta + \tilde{\sigma}^2_{jit}}; \qquad \tilde{\sigma}^2_{jit+1} = \frac{\sigma^2_\eta \tilde{\sigma}^2_{jit}}{\sigma^2_\eta + \tilde{\sigma}^2_{jit}} \tag{6}$$

3.3 Firm Preferences and Turnover

The board of directors is forward-looking and discounts the future using the discount factor β. It is risk-neutral and has preferences over profits, the prior relation of its CEO, and whether turnover is forced. Dollar profits in year t result from multiplying the firm's book value of assets b_{it} by its profitability Y_{jit}. Note that the industry component of profitability ι_{it} is assumed to be exogenous and thus has no effect on decision making under the assumption of risk-neutrality. The firm's flow utility given CEO j is given by:

$$u_{jit} = b_{it} \left(Y_{jit} + \alpha_{\varphi_i} \mathbf{1}\{m_{ji} = R\} - d^f_{it} \pi_0 \right) \tag{7}$$

where α_{φ_i} captures the firm's flow benefit of employing a related CEO, which we allow to vary by whether the firm is family-controlled or not ($\alpha_{\varphi_i} \in \{\alpha_{FC}, \alpha_{NFC}\}$). The parameter π_0 captures the board's distaste for firing a CEO (*entrenchment*). The parameters π_0 and α_{φ_i} are a constant fraction of firm assets, allowing the effects of nepotism and entrenchment to vary by firm size. We follow Taylor (2010) and assume that all profits are immediately paid out as dividends. Consequently, firm assets b_{it} are constant over time and do not affect the firm's decision problem.[23]

Additionally, the board faces two sets of preference shocks: a two-dimensional vector $\varepsilon^1_{it} = \{\varepsilon_{0it}, \varepsilon_{1it}\}$ associated with its decision to retain (ε_{0it}) or fire (ε_{1it}) its current CEO, and a three-dimensional vector $\varepsilon^2_{it} = \{\varepsilon_{Oit}, \varepsilon_{Iit}, \varepsilon_{Rit}\}$ associated with each of the three prior relations a new CEO can have with the firm. The vector ε^2_{it} is only received if there is a turnover event. All preference shocks are distributed $Gumbel(0,1)$ independent across time, firms, and alternatives.

At the beginning of every period firms realize their draw of voluntary turnover v_{it}. The probability of voluntary turnover, denoted $g(a_{jit}, \tau_{jit}, m_{ji})$, depends on the age, tenure, and type of their current CEO. If voluntary turnover is avoided, firms update beliefs and receive the preference shock vector ε^1_{it} before deciding whether to fire or retain their current CEO. Conditional on turnover and before deciding what type of CEO to hire, the board receives the preference shock vector ε^2_{it}, draws

[23] This assumption facilitates tractability as the evolution of firm assets does not need to be modeled.

the availability of a related candidate with probability p (or $p + p_s$ if the departing executive was related), and draws signals s_{kit} for insider and related candidates.

We now characterize the optimal turnover and hiring decisions of the firm. Define the state of firm i, net of preference shocks, as $x_{it} \equiv (y_{it-1}, a_{jit}, m_{ji}, B_{jit}, \tau_{jit}, \varphi_i)$.[24] Suppose a turnover event has occurred, so that $\nu_{it} + d_{it}^f = 1$. Let $x_{it}^{(k)}$ be the firm's state induced by choosing a CEO of type k at t, which includes updated priors yielded from initial quality signals for insider and related candidates.[25] The firm decides which type of CEO to hire by solving:

$$\max_{k \in \mathscr{C}_{it}} \{V_0(x_{it}^{(k)}) + \varepsilon_{kit}^2\} \tag{8}$$

where $V_0(x_{it}^{(k)})$ is the conditional value of retaining a CEO evaluated at the firm's state $x_{it}^{(k)}$ resulting from choosing a CEO of type k. Using the hiring problem in (8) we can define the conditional value function of entering the hiring decision node, either by choice or by chance, as:

$$V_1(x_{it}) = -d_{it}^f \pi_0 + E\left[\max_{k \in \mathscr{C}_{it}} \{V_0(x_{it}^{(k)}) + \varepsilon_{kit}^2\} \middle| x_{it}\right] \tag{9}$$

Expectations are computed over the choice set $\mathscr{C}_{it}$ (i.e. over the availability of related candidates), over the prior signals of quality s_{kt}, over the age of CEO candidates, and over the vector of preference shocks ε_{it}^2. The conditional value function of entering the hiring node in (9) entails the possibility of optimally hiring a new CEO from the types that might be available, the monetary cost of turnover through its effect on current profitability, and the non-pecuniary cost of entrenchment.

At the beginning of the period, and provided voluntary turnover has not happened, the firm decides whether to retain or fire its current CEO by solving:

$$\max_{r \in \{0,1\}} \{V_r(x_{it}) + \varepsilon_{rit}^1\} \tag{10}$$

Using the firing optimization problem in (10), we recursively define the firm's conditional value

[24] We leave B_{jit} in the state of the firm's problem for notational simplicity. However, the mean of beliefs is sufficient as the variance of beliefs is a deterministic function of structural parameters, the type of the CEO, and their tenure. In estimation we omit the variance of the beliefs distribution from the state.

[25] For instance, if the firm chooses an outsider (a CEO of type O) the induced state will be $x_{it}^{(O)} = (y_{it-1}, a_{j'it}, m_{j'i} = O, B_{j'it} = B_{Oit}^0, \tau_{j'it} = 1, \varphi_i)$, where $j' \neq j$ is the index of the new CEO.

function of having state x_{it} and retaining its CEO as:

$$\begin{aligned} V_0(x_{it}) &= E\Big\{ Y_{jit} + \alpha_{\varphi_i} \mathbf{1}\{m_{j,i} = R\} \\ &\quad + \beta \left[g(x_{it}) V_1(x_{it+1}) + (1 - g(x_{it})) \max_{r \in \{0,1\}} \{ V_r(x_{it+1}) + \varepsilon^1_{rit+1} \} \right] \Big| \, x_{it} \Big\} \end{aligned} \tag{11}$$

The conditional value function of retaining the current CEO includes profitability, dynastic preferences, the discounted conditional value of entering the hiring decision node next period due to voluntary turnover, and the discounted value of being at the firing decision node next period if voluntary turnover does not happen. The expectation is computed over profitability (using current beliefs), over future preference shocks ε^1_{it+1}, and over the future state x_{it+1}.

3.4 Further Model Details

To decrease the size of the state, we discretize CEO age a_{jit} into five categories: less than 40, $[40,59]$, $[60,64]$, $[65,79]$, and 80 or more. The distribution of new CEO age F_a is obtained as the empirical distribution given these categories, and is the same for all types of CEOs. We let the categorized age a_{jit} evolve stochastically according to the empirical, upper-diagonal transition matrix. (See Appendix A.2) The probability of voluntary turnover g depends on a flexible index function $\tilde{g}$ of CEO age, tenure, and type, and it also captures retirement:

$$g(x_{it}) = \begin{cases} 1 & \text{if} \quad a_{jit} >= 80 \\ \frac{exp(\tilde{g}(a_{jit}, \tau_{jit}, m_{ji}))}{1 + exp(\tilde{g}(a_{jit}, \tau_{jit}, m_{ji}))} & \text{otherwise} \end{cases} \tag{12}$$

4 Identification and Estimation

There are five sets of parameters to be identified in the model: voluntary turnover, CEO ability, profitability, utility, and related executive availability. The sources of variation that identify these parameters are observed profitability and observed turnover (voluntary and forced) over time, as well as CEO characteristics (tenure as CEO, prior relation to the firm, and age) and firm type (family-controlled or not).

Identification of the parameters of the index function $\tilde{g}$ in equation (12), which determines the probability of voluntary turnover, relies on variation in voluntary turnover rates by CEO tenure, age, and type. Our identifying assumption is that voluntary separation does not depend on beliefs after controlling for CEO age, type, and tenure. This is consistent with our reduced form findings in Table 1 suggesting that voluntary separation is unlikely to be driven by beliefs about the current executive's match quality. Instead, our identifying assumption and reduced form results are consis-

tent with the voluntary separation of CEOs being driven by age-related retirement, tenure-induced on-the-job exhaustion and preferences for change, and firm loyalty due to familial ties.

Together with our assumptions of Bayesian learning and rational expectations, the panel of firm profitability and firm CEOs helps identify the parameters of the underlying distribution of CEO match quality and the variance of the initial signals received due to prior interactions with the firm. The rational expectations assumption anchors initial beliefs for all executive types, which allows the persistent unexplained variation in profitability across firm-CEO matches by CEO-type to identify the parameters of the underlying distributions by CEO type. Importantly, we do not include indicators for executive type in the profitability equation in (4); hence, we are able to use this persistent unexplained variation to identify not only the common variance (σ_θ^2) but also the means ($\mu_{O\theta}$, $\mu_{I\theta}$, $\mu_{R\theta}$) of the distributions of ability. Our common variance assumption allows us to use differences in persistent unexplained variation in profitability by CEO type to identify the variance of the insider and related prior signals (σ_{sI}^2, σ_{sR}^2).

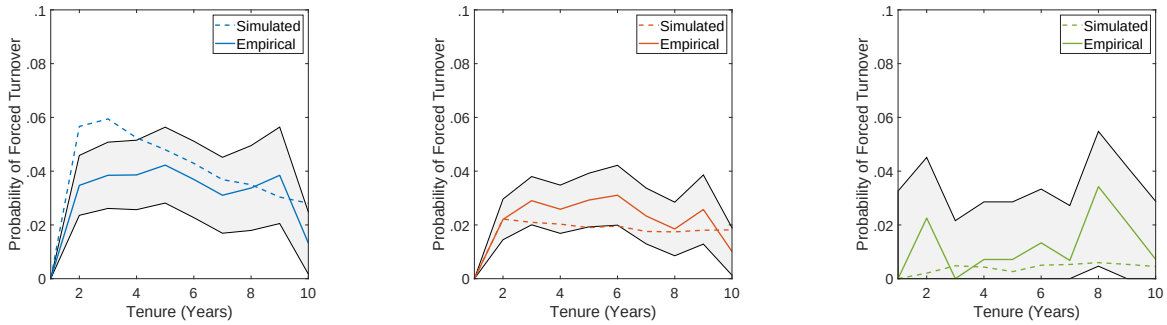
The persistence parameter (ρ) is identified off of the persistence in profitability across firms in the panel. The monetary cost of turnover (c) is identified off of changes in profitability around turnover events. Since turnover is endogenous it is critical for identification of c that we model the firing decision to account for the selection process based on unobserved, time-varying beliefs about CEO match quality. The variance in profitability shocks (σ_η^2) is identified using the residual idiosyncratic variation in profitability across all firms and years, after removing profitability persistence, turnover effects, and unobserved persistence within firm-CEO matches.

Identification of the utility payoffs is standard following results in Magnac and Thesmar (2002) and Arcidiacono and Miller (2020). Given the assumed two-step structure of the problem (first firing, then hiring), the distribution of alternative-specific taste shocks, the subjective discount factor, the voluntary turnover transition function, and the transition function of beliefs implied by equations (5) and (6), hiring and firing rates of executives identify the non-pecuniary payoffs from related employment ($\alpha_{FC}, \alpha_{NFC}$) and the entrenchment utility cost (π), up to the normalization that the flow payoff from employing an unrelated CEO only depends on profitability. Moreover, since we normalize the coefficient of profitability in the utility function to one, boards of directors in firms of both types (FC or NFC) with all types of executives (related, insider, or outsider) value profitability identically as a share of assets.

Finally, since we do not observe the supply of related candidates, the parameters capturing the probability of available related candidates (p, p_s) are essentially mixture parameters. To aid identification of these probabilities separate from the utility payoff parameters associated with related CEOs ($\alpha_{FC}, \alpha_{NFC}$), we rely on differences in both hiring and firing rates between related executives and other types. While differences in hiring and firing rates between related and un-

related CEOs are informative for the utility payoffs ($\alpha_{FC}, \alpha_{NFC}$), differences in the hiring rates are more directly affected by availability constraints (p, p_s). In particular, identification of p_s (the increased probability of a related candidate following the departure of a related CEO) relies on the rate of related-to-related transitions upon turnover.

We jointly estimate all model parameters using the Simulated Method of Moments (SMM).[26] Overall, we use thirty moments for estimation, which include: the coefficients of an AR(1) regression of profitability controlling for the CEO's prior relation to the firm, firm type, and recent turnover episodes; the coefficients of a regression of forced turnover on tenure and tenure interacted with the CEO's prior relation to the firm; proportions of insider and related CEOs by firm and predecessor type; the variance across CEO spells of the within-spell mean of residual profitability; and the mean across CEO spells of the within-spell variance of residual profitability. Standard errors are computed based upon the asymptotic distribution of the SMM estimator (Duffie and Singleton, 1993). See Appendix A.3 for a more detailed description of the estimation process.



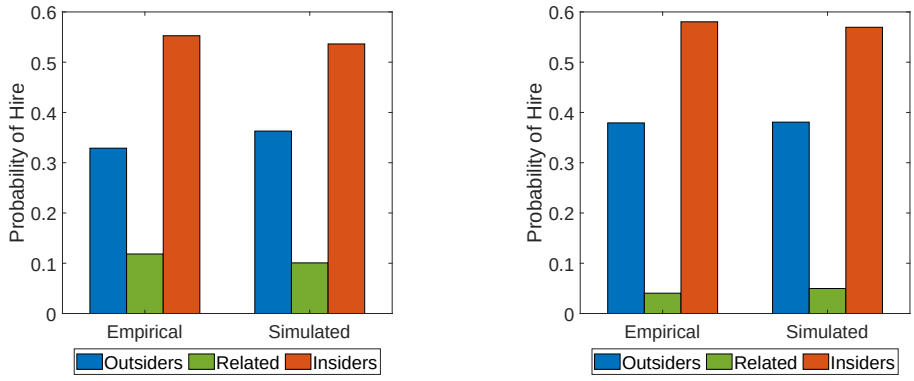
(a) Outsiders (b) Insiders (c) Related

FIGURE 5: Model Fit: Forced Turnover Hazards

Notes: Solid lines denote the empirical rates while dashed lines denote the simulated one. The gray shaded region indicates the 95 percent confidence intervals around the empirical rates.

The model fits the data well in both the firing and hiring margins. At the firing margin, Figure 5 shows that the simulated hazards capture well the level and trend of the empirical hazards only over predict forced termination for outsiders in the first years of tenure. For the overwhelming majority of tenure levels and for all executive types, the simulated hazards lie within the 95 percent confidence interval of the empirical hazards. At the hiring margin, Figure 6 shows that the model is able to generate very closely the hiring rates of all types of CEOs across both types of firms. Importantly, the model is able to generate the differences in hiring rates of related CEOs between FC and NFC firms. Additional measures of model fit can be found in Appendix A.3.

[26] For each parameter vector in the estimation algorithm we create twenty simulated samples with their respective simulated moments, and average the simulated moments over the twenty simulations. The weighting matrix for estimation is the inverse of the variance-covariance matrix of the vector of moments, which is the sample counterpart of the optimal weighting matrix.



(a) Family-controlled

(b) Non-family-controlled

FIGURE 6: Model Fit: CEO Hiring Shares Conditional on Turnover

Notes: Figure shows the empirical and simulated hiring probabilities for each firm type, conditional on a turnover event.

5 Structural Estimates

Our structural estimates in Table 4 indicate that insider CEO candidates are better on average than related candidates, but related candidates are better than outsiders.[27] Since the units of the firm's flow utility are in percent of assets (ROA), we multiply each coefficient by the median firm's assets ($1.8 billion) to provide our estimates in terms of value for the median firm. Using our profitability equation in (4), the estimated average match quality of an outsider CEO candidate is equivalent to a -$17 million rate of average profits. [28] Insider and related average CEO candidates are equivalent to -$.47 million and -$5.67 million in average profits, respectively. The negative estimates of the average quality for the three types of CEO candidates highlights the important role that prior information can play as selection mechanism. Also relevant for selection, the estimated common variance of the candidate distributions implies that for the median firm a high-quality executive (90th percentile) generates approximately $61.2 million more in average profits than a low-quality hire (10th percentile). Consistent with results in Taylor (2010), we find that the variation in firm profitability is largely idiosyncratic. A standard deviation ($\sigma_\eta = 6.37$) increase in idiosyncratic profitability corresponds to an increase in average profits of about $116 million.

Firms' preferences for employing related CEOs (α_{FC}, α_{NFC}) are positive and significant in both types of firms, revealing preference-based hiring practices. Unsurprisingly, preferences for related candidates are stronger in family-controlled firms. These firms are willing to sacrifice 3.91

[27] Table 4 contains our main estimates. We relegate to Table A.6 in Appendix A.3.4 our estimates of the probability of voluntary turnover. Our estimate for ρ in Table 4 reveals that the persistence in profitability is high ($1-\rho = .795$).

[28] Our mean-reversion profitability process in (4) implies that as tenure increases average profitability within a CEO spell approaches the CEO's quality. Hence, to obtain the effect of average CEO candidate quality on average profits for the median firm we multiply $\mu_{O\theta}/100$ by the median firm's assets.

TABLE 4: Parameter Estimates

CEO Candidate Ability				*Prior Signals*		*Profitability*			*Utility*			*Related Supply*	
$\mu_{O\theta}$	$\mu_{I\theta}$	$\mu_{R\theta}$	σ^2_θ	σ^2_{sI}	σ^2_{sR}	ρ	σ^2_η	c	π	α_{FC}	α_{NFC}	p	p_s
-.931	-.026	-.311	1.72	.814	1.33	.205	40.6	1.47	10.2	3.91	.331	.081	.189
(.146)	(.017)	(.376)	(.143)	(.219)	(.490)	(.009)	(.458)	(.321)	(.363)	(2.08)	(.192)	(.011)	(.071)

Notes: Standard errors are included in parentheses. Additional details can be found in Appendix A.3.3.

(α_{FC}) percent of assets per year in exchange for employing a related CEO, equivalent to $70.4 million per year for a median-sized firm. For non-family-controlled firms preferences are much milder, .331 (α_{NFC}) percent of assets or $5.96 million per year for a median-sized firm. These preferences for related candidates influence firm behavior on both the hiring and firing margins. On the hiring margin, firms are willing to sacrifice a considerable amount of CEO quality in exchange for employing a family member. This lowers the expected level of quality needed to hire family candidates relative to insiders. On the firing margin, preferences for related candidates increase boards' hesitation to terminate low-performing family executives, increasing the average employment length for related CEOs.

We find that the costs associated with executive turnover are large and firms appear to have a very high distaste for firing their CEOs. On the one hand, the estimated pecuniary cost associated with turnover (c) is 1.47 percent of assets or about $26.8 million for the median firm. This amount captures various monetary costs associated with turnover such as severance payments, recruitment expenses, strategic management adjustment, and associated turnover at lower levels of management. The estimated non-pecuniary cost that boards incur upon firing a CEO (π) is significantly higher, 10.2 percent of total assets, equivalent to $183.6 million for the median firm. While our estimated monetary cost of turnover is very close to the one in Taylor (2010), our estimated non-pecuniary cost is roughly twice as large. This reflects the boards' option value of turnover in the presence of multiple pools of executive talent (outsiders, insiders, related). Although the availability of the related pool is rather low for firms with insider or outsider executives. Our mixture parameters (p, p_s) indicate that the probability of having related candidates available, estimated to be 0.081, climbs to .270 ($p + p_s$) if a related executive is at the helm.

5.1 Information Quality and The Speed of Learning

Our estimates imply that when hiring outsiders, the board faces approximately three times as much uncertainty relative to an insider candidate and two times as much uncertainty relative to a family candidate. These differences in uncertainty at the time of hire emerge from the information revealed to firms via previous relations with insider and related candidates. We capture the quality of this information through the estimated variance of pre-hire insider and related signals (σ^2_{sI}, σ^2_{sR}).

The prior variance after receiving pre-hire signals is $\sigma_\theta^2\sigma_{sI}^2/(\sigma_\theta^2+\sigma_{sI}^2) \approx .55$ for insider candidates and $\sigma_\theta^2\sigma_{sR}^2/(\sigma_\theta^2+\sigma_{sR}^2) \approx .75$ for related candidates. For outsider candidates, the prior variance corresponds to the population variance of ability (1.72). Notably, given the high idiosyncratic variation in ROA (σ_η^2), we find that pre-hire information about insider and related executive candidates has lower noise than on-the-job information received from an incumbent CEO. After one year on the job, an outsider executive, for whom the firm has no pre-hire information, will have a prior variance of $\sigma_\theta^2\sigma_\eta^2/(\sigma_\theta^2+\sigma_\eta^2) \approx 1.65$. This confirms that the option to hire from within the firm, irrespective of the candidate's family status, is substantially less risky than hiring externally.

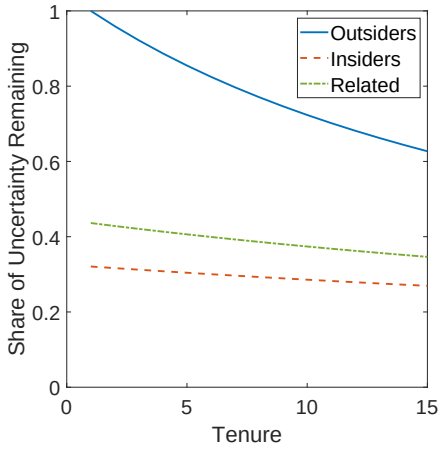


FIGURE 7: Uncertainty Reduction over Tenure

Notes: Remaining uncertainty is the ratio of the variance of beliefs at tenure t to the variance of the population distribution of quality of CEO candidates, $\tilde{\sigma}_{jit}^2/\sigma_\theta^2$.

As firms receive more signals over an executive's tenure, the variance of beliefs is reduced and the executive's match quality is gradually revealed. To get a sense of the speed at which this occurs, Figure 7 plots the percent of uncertainty remaining as tenure increases.[29] Overall, the large noise from on-the-job signals due to the large idiosyncratic variation in profitability causes the learning process to happen slowly. For outsider CEOs, 72 percent of the uncertainty still remains after ten years of tenure. For insider and related CEOs, respectively, only 29 percent and 37 percent of the uncertainty still remains after ten years of tenure. A large portion of the reduction in uncertainty for insider and related executives happens at the time of hire, roughly 68 and 56 percent, respectively. This is a result of the firm's additional information obtained in previous interactions with related and insider candidate.

The presence of information frictions also creates differences in the average quality of surviving executives. These differences emerge from the way in which information drives the board's hiring

[29]Remaining uncertainty is computed as $\tilde{\sigma}_{jit}^2/\sigma_\theta^2$, which is the variance of beliefs at tenure t as a proportion of the variance of the population distribution of quality of CEO candidates.

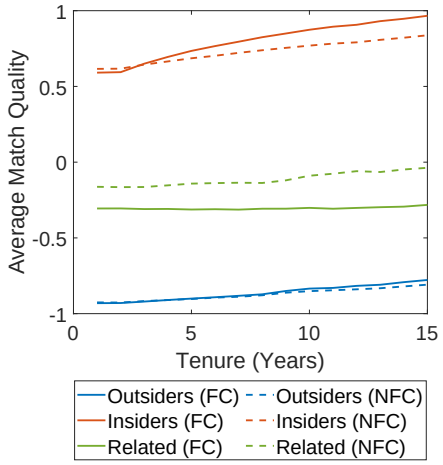


FIGURE 8: Positive Selection over Tenure

Notes: Figure plots the average match quality of each type of CEO over the first 15 years of tenure. Solid lines correspond to family-controlled firms while dashed lines correspond to non-family-controlled firms.

and firing decisions. Figure 8 shows that the gap in average match quality across CEO types emerges from the time of hire. This initial gap corresponds to both differences in average quality in the respective distributions of executive candidates (Table 4) as well as differences in the strength of positive selection. For insider and related candidates, the presence of prior information allows firms to make precise assessments of candidate quality pre-hire. As a result, the average insider CEO has quality far above the average insider candidate ($\mu_{I\theta} = -.026$). For related CEOs the strength of this selection mechanism is damped by the presence of family preferences (nepotism), which lead firms to be less selective when appointing related CEOs. Hence, despite the precise pre-hire signals about the quality of related candidates, the average quality of related CEOs is closer to that of outsider CEOs, of whom firms have no prior information. This result is consistent with previous findings in the empirical literature which suggest that inherited firm control leads to a deterioration of managerial quality and firm performance (Peréz-González, 2006; Bloom et al., 2010; Bennedsen et al., 2007). To quantify the impact of these differences in average CEO quality we retort to the median size firm. For FC firms, the average insider and related CEO yield $6.3 million and $2.1 million more in cash flows per year than the average outsider CEO, respectively. For NFC firms, the average insider and related CEO yield $6.1 million and $3.0 million more in cash flows per year than the average outsider CEO, respectively.

As tenure increases, Figure 8 also reveals the extent to which firms exercise their ability to select through firing as they acquire information. The relationship between average match quality and tenure is positive, showing that higher quality CEOs are more likely to survive in their positions. However, the relationship between average match quality and tenure is much weaker

for related CEOs. This is a consequence of family preferences, particularly for family-controlled firms. Nepotism leads boards to be more permissive with related CEOs at the firing margin, which in turn flattens the gradient between tenure and average quality for related executives. In non-family-controlled firms this gradient is steeper since their family preferences are weaker, and they are more willing to terminate low-performing related executives.

6 Nepotism, Firm Value and Turnover Behavior

In this section we assess the impact of anti-nepotism policies on the performance of family-controlled and non-family-controlled firms, as reflected in their net present value (NPV). In our model, anti-nepotism policies can impact firm performance by reducing the pool of talent, by exposing the firm to more uncertainty (as firms know more about related candidates), by increasing the probability of voluntary turnover (as related CEOs are less likely to leave voluntarily), and by preventing firms from appointing related CEOs based on anti-meritocratic, family preferences. First, we simulate firm outcomes in an environment with no nepotism ($\alpha_{FC} = \alpha_{NFC} = 0$) to isolate the impact of related preferences on firm value. Next, we simulate outcomes in an environment with no nepotism or CEO entrenchment ($\alpha_{FC} = \alpha_{NFC} = \pi = 0$). Finally, we impose a mandate forbidding firms from hiring related CEOs. We focus on how nepotism impacts firm value, turnover decisions, the quality of surviving executives, and the spell length of CEOs.

To implement our counterfactual policies and compare them to the baseline we first replicate all firms in the sample who underwent a turnover event (67 FC firms and 1,674 NFC firms). We then let these firms operate under the baseline and under the counterfactual policies for the length of our sample (18 years). We start all firms from an instance of turnover so that all CEOs start with no initial tenure. We simulate each of the replicated firms 50 times in the baseline and counterfactual environments. Results are summarized by firm type in Panels A (family-controlled firms) and B (non-family-controlled firms) of Table 5.

6.1 Nepotism, Entrenchment, and CEO Selection

Although nepotism presents firms with countervailing incentives, we find that the benefits of nepotism outweigh the costs for both FC and NFC firms. As discussed by Taylor (2010), CEO entrenchment induces a wedge between the shareholder-optimal firing policy and the board's enacted firing policy. However, the reduction in NPV in Columns (2) and (6) in Table 5 relative to the baseline shows that nepotism has a counteracting effect on this wedge. Preference for related CEOs raises the opportunity cost of employing unrelated CEOs, speeding the rate at which low-quality insiders and outsiders are fired. This effect is most pronounced for FC firms, as their estimated related preferences are larger ($\alpha_{FC} > \alpha_{NFC}$ in Table 4).

TABLE 5: The Impact of Nepotism, Entrenchment and an Anti-Nepotism Mandate

	Panel A: Family-Controlled Firms				*Panel B: Non-Family-Controlled Firms*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	No Nepotism	No Nepotism or Entrenchment	Mandate	Baseline	No Nepotism	No Nepotism or Entrenchment	Mandate
Net Present Value								
NPV ($1 billion)	26.2	26.1	27.5	26.1	16.8	16.8	18.5	16.7
%Δ NPV		-.123	5.23	-.228		-.017	10.3	-.328
Hiring Probabilities								
Outsider	.340	.374	.147	.406	.375	.384	.155	.412
Insider	.555	.584	.819	.595	.574	.580	.818	.588
Related	.105	.041	.034	0	.052	.036	.033	0
CEO Quality								
Outsider	-.844	-.862	-.863	-.858	-.857	-.856	-.829	-.857
Insider	.805	.754	.927	.726	.767	.762	.923	.739
Related	-.291	-.122	.762	-	-.091	.007	.702	-
Forced Turnover Rate								
Outsider	.049	.036	.192	.034	.033	.033	.194	.032
Insider	.025	.015	.094	.013	.015	.015	.094	.014
Related	0	.019	.174	-	.005	.010	.160	-
Spell Lengths (Years)								
Overall								
Outsider	8.40	9.47	4.08	9.54	9.38	9.42	3.93	9.52
Insider	9.73	10.7	6.26	10.8	11.1	11.1	6.35	11.2
Related	13.0	11.5	4.89	-	12.4	11.8	4.76	-
High Quality CEOs								
Outsider	8.44	9.55	4.14	9.56	9.51	9.55	4.00	9.66
Insider	10.7	11.5	6.84	11.6	11.7	11.7	6.95	11.8
Related	12.5	12.3	4.96	-	12.9	12.7	5.09	-
Low Quality CEOs								
Outsider	8.27	9.04	3.82	9.26	8.81	8.85	3.61	8.95
Insider	7.55	8.97	4.85	9.21	9.67	9.74	4.85	9.95
Related	13.3	10.8	4.02	-	12.1	10.9	4.00	-

Notes: *Baseline* is the estimated model in Table 4; *No Nepotism* makes the family preferences equal to zero ($\alpha_{FC} = \alpha_{NFC} = 0$); *No Nepotism or Entrenchment* makes the family preferences as well as the utility cost of firing equal to zero ($\alpha_{FC} = \alpha_{NFC} = \pi = 0$); *Mandate* prohibits related candidates from being hired. *CEO Quality* is a measure of average profitability since our mean-reversion profitability process in (4) implies that as tenure increases average profitability within a CEO spell approaches the CEO's quality. *High Quality* (*Low Quality*) CEOs are those with match quality above (below) the 90^{th} (10^{th}) percentile of the type-specific population distribution $N(\mu_{k\theta}, \sigma^2_\theta)$.

The profit-maximizing hiring and firing behavior of boards is captured in columns (3) and (7) where both entrenchment and nepotism are neutralized. Focusing on family-controlled firms, the baseline simulation in column (1) yields rates of forced turnover that fall far short of their profit-maximizing level in column (3) for outsiders (.049 vs .192), insiders (.025 vs .094), and related CEOs (0 vs .174).[30] This effect is also found in non-family-controlled firms. The interaction

[30]In the baseline simulation, no related CEOs were fired in family-controlled firms. This is consistent with the

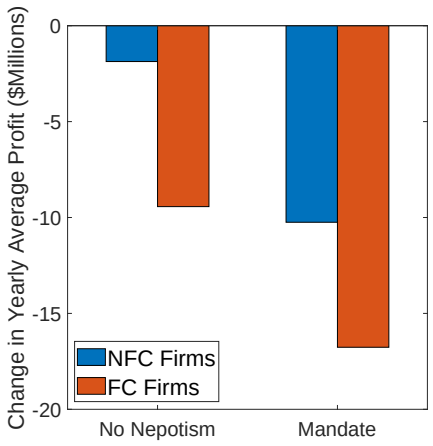
between entrenchment and nepotism is highlighted by looking at the forced turnover rates in the environment with entrenchment but without nepotism in column (2). Eliminating only nepotism leads the forced turnover rates to fall even further below their efficient level for outsider (0.36 vs .192) and insider CEOs (.015 vs .094). Consistently, the effect of entrenchment on outsider and insider employment lengths is exacerbated when nepotism is eliminated. This effect is reversed for related CEOs. Removing nepotism increases their forced turnover rate relative to the baseline (.019 vs 0) and decreases their average lengths of employment (11.5 vs 13 years). Thus, related preferences effectively decrease the level of outsider and insider entrenchment but compound the level of entrenchment for related CEOs.

Additionally, we find that nepotism has a positive impact on board selectivity at the hiring margin. While this result may seem counter-intuitive at first, this is driven by the same mechanism described in the previous paragraph. Nepotism raises the opportunity cost of hiring insider and outsider candidates, and therefore raises the threshold of perceived quality necessary for these candidates to be selected for hire. Consistently, in the presence of nepotism (*Baseline* in Table 5), insider CEOs are of higher average quality than in the environment without nepotism for both FC firms (.805 vs .754) and NFC firms (.767 vs .762). To further understand the magnitude of these differences, the left bars in Figure 9 show the change in average yearly profits generated by insider CEOs upon the elimination of nepotism. For family-controlled firms insider CEOs generate roughly $9.48 million less in yearly profits when nepotism is eliminated. For non-family-controlled firms the effect is more modest; insider executives generate roughly $1.87 million less in yearly profits on average in the absence of nepotism. Through its positive effect on insider match quality, nepotism thus enhances firm value. However, this positive effect is attenuated by its negative impact on the average match quality of related executives. Nepotism leads firms to sacrifice quality in exchange for the flow benefits associated with related employment.

In summary, in the presence of CEO entrenchment, nepotism increases the efficiency of boards' firing policies. On the one hand, nepotism exposes firms to the occasional employment of low-quality related CEOs. On the other, it accelerates the termination of low-quality insiders and outsiders, and it increases the average match quality of hired insider candidates who must compete against otherwise preferred related candidates. The latter effect dominates given our estimates.

empirical rate of forced turnover among FC firms, which is not statistically different from zero. Since there is still voluntary turnover, the average spell lengths of related CEOs in FC firms does not equal the length of the simulation (18 years).

FIGURE 9: Change in Insider Quality Under No Nepotism and Mandate



Notes: Changes are relative to the *Baseline* columns in Table 5. *No Nepotism* makes the family preferences equal to zero ($\alpha_{FC} = \alpha_{NFC} = 0$); *Mandate* prohibits related candidates from being hired.

6.2 A Mandate against Family CEOs

We find that a mandate that prohibits firms from hiring related candidates slightly decreases firms' NPV.[31] Since firms have preferences for related candidates, it is possible for such a mandate to increase firm performance by preventing boards from making personnel choices that are not purely based on the expected quality of an executive candidate. However, preventing firms from accessing their pool of related candidates removes some of the competitive pressure at the hiring margin, reducing the threshold of expected quality necessary to hire insider candidates. The strength of these countervailing forces, which make ex-ante ambiguous the net effect of this strict anti-nepotism mandate, depends on the strength of the board's preference for family and on the availability related candidates (Table 4).

Columns (4) and (8) in Table 5 show the effects of the mandate on NPV relative to the baseline. NPV decreases by .228 percent in NFC firms and by .328 percent in FC firms. This result reveals that the value of the pool of related executive candidates as a source of less risky talent slightly dominates the potential negative effects on NPV from nepotism and related entrenchment. The decline in NPV is due to the fact that firms can no longer be as selective. This mechanism is illustrated in the right bars of Figure 9. The mandate strictly lowers the average quality of insider CEOs at the hiring margin. By construction, it has no effect on the average quality of outsider CEOs.[32]

The negative effect of the mandate on insider average quality is compounded by an increase

[31] The mandate effectively sets the supply probabilities (p and p_s) equal to zero for both FC and NFC firms.

[32] The expected value of quality of outsider CEOs at the hiring margin does not change as they are selected with no additional prior information in both, the baseline and the counterfactuals.

in the hiring rate of insiders relative to the baseline (.595 vs .555 in FC firms). However, we find that firms do not fully substitute less risky talent with less risky talent (i.e. related candidates with insiders) in the presence of the mandate. Eliminating the supply of related CEO candidates also increases the probability of hiring outsider executives (.406 vs .340 in FC firms). As suggested by Figure 8, this increased exposure to outsiders comes with a decrease in the average quality of executives as firms cannot exercise their selectivity in the absence of prior information. Overall, the reduction in profits upon the anti-nepotism mandate suggests that related candidates serve as a value-enhancing pool of executive talent.

7 Conclusion

We develop a dynamic framework to study the impact of nepotism on the choice of CEO and the associated impact on firm performance among publicly traded US firms. Surprisingly, our results show that board of director favoritism toward family members when choosing to hire, retain, and fire the CEO has a positive (though small) impact on the profits of firms in our sample. This reflects the operation of conflicting mechanisms. Regarding the costs of nepotism, boards of directors in our sample prefer to employ a family member as CEO, even when unrelated candidates of higher expected quality are available. The desire to trade preference for merit negatively impacts firm performance. However, we also find that there are two important benefits that stem from having a pool of family CEO candidates. First, the presence of related candidates increases firms' selectivity when evaluating unrelated candidates, leading to the employment of higher quality executives and thus boosting performance. Second, nepotism implies the board is quicker to fire poorly performing unrelated CEOs when a family member is available, partially reversing the negative effects of CEO entrenchment. On balance, these benefits of nepotism outweigh the costs in our sample. For example, a counterfactual policy prohibiting firms from employing related CEOs reduces the NPV of the median family-controlled (or non-family-controlled) firm by approximately $60 million over 18 years.

Throughout the paper, we restrict attention to large, publicly-traded firms. An important extension to our empirical approach, which we do not currently pursue given data limitations, would be to study the behavior and performance of privately-held firms. Several papers, Bertrand and Schoar (2006) and Claessens et al. (2000) for example, document that family-controlled firms tend to be privately held and smaller than average. It is plausible that nepotism is a stronger determinant of personnel decisions and firm performance in these smaller firms. For example, our results hint that the superior performance of family firms may be partially explained by the greater supply of family talent.[33] Another extension of the model would be to incorporate CEO pay into the frame-

[33] Recall that our estimates imply that FC firms in our sample are three times more likely to have a related candidate

work. Unrelated CEOs are less entrenched when related candidates are available, increasing their risk of being fired and potentially reducing the cost of incentive alignment. Additionally, uncertainty about the CEO contribution to firm performance may have consequences for the form of the optimal contract (Prat and Jovanovic, 2014; Demarzo and Sannikov, 2017). As shown in Lyman (2023) this significantly complicates the model presented here, so we leave this application for future research.

CEO available compared to NFC firms.

A Appendix

A.1 Data Appendix

Compustat Data. We obtain company fundamentals data from Compustat North America, which contains a rich set of financial information on publicly held companies in Canada and the U.S. Using operating income before depreciation (item *oibdp*) and total assets (item *at*) we compute return on assets (ROA_{ijt}) for each firm-year as:

$$ROA_{ijt} = \frac{2 * oibdp_t}{at_t + at_{t-1}}$$

In the estimation and descriptive sections, we report results using the industry-adjusted ROA, which is simply ROA_{ijt} demeaned by industry-year. Industries are defined using the Standard Industry Classification (SIC) codes. We group firms by major SIC classification, which yields nine industries.[34] We drop observations for which year, operating income before deprecation, or total assets are not reported (67,897 observations). For firms with gaps in records (i.e. one or more years in their time series are missing), we drop the firm's record after the first gap (4,779 observations).

Execucomp data. We obtain data on CEO tenure, pay, and demographic information from Execucomp. Compustat and Execucomp uniquely identify firms using the ID *gvkey* and executives using the ID *execid*. Execucomp reports both the dates an executive joined the company and the date they became CEO. We use this in the definition of an insider:

$$\text{Insider CEO} \iff \text{Year became CEO} - \text{Year joined company} > 2$$

The date of joining the company is not reported for a significant number of executives in Execucomp (3,758 distinct executives amounting to 19,632 observations). To increase our coverage we hand-collected this information using mainly the information aggregator NNDB.com. If the date was not available at NNDB, then we checked in LinkedIn, Bloomberg, and investor relations web pages. If dates were still not available, we searched on SEC filings and relevant articles in the business press.

Forced turnover data. Data on forced CEO turnover was graciously shared by Florian Peters. He and a team of researchers gathered these data for CEOs listed in Execucomp from years 1995 to 2015. The criteria used to classify turnover as forced are described in detail in Peters and Wagner (2014) and Jenter and Kanaan (2015). Both methodologies follow the three-step criteria to classify

[34] Six firms (86 observations) have nonclassifiable industries. We drop these from our estimation sample.

successions as forced from Parrino (1997):

1. "All successions for which the *Wall Street Journal* reports that the CEO is fired, forced from the position, or departs due to unspecified policy differences are classified as forced."
2. "All other successions in which the departing CEO is under age 60 are reviewed to identify cases in which the *Wall Street Journal* announcement of the succession either (1) does not report the reason for departure as involving death, poor health, or the acceptance of another position (elsewhere or within the firm), or (2) reports that the CEO is retiring, but does not announce the retirement at least six months before the succession. These cases are also classified as forced successions."
3. "The circumstances surrounding departures that are classified as forced in the previous step are further investigated by searching the business and trade press for relevant articles. These successions are reclassified as voluntary if the incumbent takes a comparable position elsewhere or departs for previously undisclosed personal or business reasons that are unrelated to the firm's activities."

If turnover is not classified as forced in Florian Peters' data, it is assumed to be voluntary. For a small number of cases, forced turnover is reported in year t, but the executive is still listed as CEO in year $t+1$. To avoid inconsistencies, all indicators of turnover are moved to the last year of the CEOs tenure as reported in Execucomp. In our final sample, we observe 590 instances of forced turnover and 1,577 instances of voluntary turnover.

Prior familial relation to the firm. We hand collected data on family ties within firms using Definitive Proxy Statements (DEF 14A) filed with the Security and Exchange Commission as our main source of information. For CEOs for which a family tie could not be verified via DEF 14A, we conducted Internet searches. We define a CEO as related if they have any direct family relations, by blood or marriage, to the founder, another board member, or a previous CEO, as indicated in the EDGAR database or elsewhere in Internet searches. Of the 4,521 executives in our final sample, 415 (9.2%) are classified as related CEOs.

Osiris data. To determine which firms are family-controlled, we use ownership data from the Osiris database, which surveys firms globally and identifies those in which a single entity owns at least 25 percent of outstanding equity. Examples of controlling entities are banks, governments, private equity firms, or other corporations. If Osiris states that a firm is controlled by "one or more named individuals or families," we classify them as "family-controlled."

After classifying Osiris firms as family-controlled or not, we merge these data with our main sample using stock ticker and company name. We first merge the main sample with Osiris by stock ticker. Because Osiris is a global database and firms are traded on different exchanges (for instance, if they are based in different countries), different firms in the data may share the same ticker. To overcome this, we use *matchit* in Stata to conduct a subsequent name comparison within each stock ticker. Within each stock ticker, we compare company names and only keep the highest quality match as determined by *matchit*'s simple similarity score function. This results in exactly one firm per stock ticker. Lastly, we hand check any observations with imperfect name matches. This last step results in 26 firms being dropped.

A.1.1 Firm Performance and CEO Tenure

TABLE A.1: IA-ROA Regression

	(OLS)		(FE)	
	Coefficient	SE	Coefficient	SE
Constant	-.961	(1.94)	-14.4	(16.0)
Performance Lag	.822***	(.011)	.452***	(.028)
Tenure	-.011	(.016)	-.497	(.310)
Tenure^2	$2.8e^{-4}$	($4.5e^{-4}$)	$-4.6e^{-4}$	(.002)
Age	.029	(.067)	.313	(.383)
Age^2	$-2.0e^{-4}$	($5.8e^{-4}$)	.001	(.002)
Observations	20,401		20,401	

Notes: The dependent variable in both columns is IA-ROA. Column (1) estimates the model by OLS while column (2) includes fixed effects for each CEO-firm match. *, **, and *** denote significance at the 10% level, 5% level, and 1% level respectively. Both columns suggest that the dependence of firm performance on CEO tenure is insignificant.

In Table A.1, we regress industry-adjusted ROA on its lag and a vector of CEO characteristics, with and without firm fixed effects. In both cases, the coefficient on CEO tenure is not statistical distinguishable from zero, performance is largely unaffected by mere increases in tenure. Such a pattern is inconsistent with, for example, CEO learning by doing.

A.2 Model Appendix

A.2.1 CEO Age

To reduce the size of the state space, we discretize CEO age a_{jit} into 5 categories $\bar{a}_{jit}$ as follows:

$$\bar{a}_{jit} = \begin{cases} 1 & \text{if} \quad a_{jit} < 40 \\ 2 & \text{if} \quad a_{jit} \in [40,59] \\ 3 & \text{if} \quad a_{jit} \in [60,64] \\ 4 & \text{if} \quad a_{jit} \in [65,79] \\ 5 & \text{if} \quad a_{jit} \geq 80 \end{cases} \tag{A.1}$$

Upon being hired, each CEO j has an age category drawn from the empirical distribution of $\bar{a}_{ijt}$ conditional on turnover (denoted by F_a). The associated probability mass function is given in Table A.2.

TABLE A.2: Distribution of $\bar{a}_{jit}$ Conditional on Turnover

	Age Group				
	< 40	$[40,59]$	$[60,64]$	$[65,79]$	≥ 80
Probability	.0247	.8526	.0897	.0325	.0005

In our empirical specification $\bar{a}_{jit}$ evolves stochastically with the following transition probabilities computed from the data:

TABLE A.3: Empirical Age Transition Probabilities

Age Group	< 40	$[40,59]$	$[60,64]$	$[65,79]$	≥ 80
< 40	.7043	.2957	0	0	0
$[40,59]$	0	.9305	.0695	0	0
$[60,64]$	0	0	.8848	.1152	0
$[65,79]$	0	0	0	.9903	.0097
≥ 80	0	0	0	0	1

A.3 Estimation Appendix

For estimation we minimize a standard SMM objective function using the particle swarm algorithm. The process is summarized as follows:

1. *Set initial guesses for second-stage parameters:* We set initial values for the parameters $\Theta = \{\Theta_g, \mu_{O\theta}, \mu_{I\theta}, \mu_{R\theta}, \sigma^2_\theta, \sigma^2_\eta, \sigma^2_{sI}, \sigma^2_{sR}, \rho, c, \pi, \alpha_{FC}, \alpha_{NFC}, p, p_s\}$, where Θ_g denotes the parameters of the voluntary turnover process. We manually choose an initial guess, but subsequent guesses are selected by the minimization algorithm mentioned above.

2. *Discretize state space and compute state transition matrix:* To initialize the economic environment, we construct a discrete grid for the continuous variables $\tilde{\theta}_{jit}$ and y_{it-1}. The grid consists of 20 equally-spaced points centered on the initial guess for μ_θ. Next, we compute a transition matrix to describe the evolution of beliefs over tenure. The probability of moving from $\tilde{\theta}_{jit}$ to $\tilde{\theta}_{jit+1}$ given other relevant state variables is:

$$\begin{aligned}
&\pi(\tilde{\theta}_{jit}, \tilde{\theta}_{jit+1} | m_{jit}, \tau_{jit}, y_{it}) = \Phi(y_u | m_{jit}, \tau_{jit}, y_{it}) - \Phi(y_l | m_{jit}, \tau_{jit}, y_{it}) \\
&= \Phi\left((1-\rho) y_{it} + \frac{\rho}{\tilde{\sigma}^2(\tau_{jit})} \left((\tilde{\theta}_{jit+1} + \phi/2)(\tilde{\sigma}^2(\tau_{jit}) + \sigma^2_\eta) - \tilde{\theta}_{jit} \sigma^2_\eta \right) | m_{jit}, \tau_{jit}, y_{it} \right) \\
&\quad - \Phi\left((1-\rho) y_{it} + \frac{\rho}{\tilde{\sigma}^2(\tau_{jit})} \left((\tilde{\theta}_{jit+1} - \phi/2)(\tilde{\sigma}^2(\tau_{jit}) + \sigma^2_\eta) - \tilde{\theta}_{jit} \sigma^2_\eta \right) | m_{jit}, \tau_{jit}, y_{it} \right) \qquad \text{(A.2)}
\end{aligned}$$

   where m_{ijt} is the current CEO's managerial type, τ_{jit} is the CEO's tenure, and y_{it} is firm performance in period t. ϕ denotes the space between points in the profitability grid.

3. *Solve the value functions:* Next, we solve for V_0 and V_1 by iterating the corresponding Bellman equations. V_0 is the value of retaining a CEO while V_1 is the value associated with turnover. Each of the value functions is dependent on the state variables $x_{it} = \{\tilde{\theta}_{jit}, \tilde{\sigma}_{jit}, m_{jit}, y_{it-1}, a_{jit}, \varphi_i\}$. We start with an initial guess for each of the value functions, then iterate until we approximate the fixed point as determined by convergence criteria $\|T_k(V_k) - V_k\| < .1$ where T_k for $k \in \{0,1\}$ are contraction mappings whose fixed points are V_0 and V_1, respectively.

4. *Simulate initial conditions:* To correct for bias induced by left-censoring of our data, we first simulate decision-making until the simulated distribution of tenure matches the empirical distribution in the first year of the sample. Specific details on this procedure are discussed in Appendix A.3.1. For this step we simulate data for 5,000 firms. Firms' hiring and firing decisions are based on the value functions obtained in the previous step.

5. *Construct firm panel and compute simulated moments:* Following this simulation of initial conditions, we simulate the model for 20 additional years and construct a panel of the 5,000 simulated firms and their optimal decisions. We use this panel to compute simulated moments using the exact same code employed to compute the empirical moments, which helps avoid inconsistencies during estimation. Next we evaluate the SMM objective function below:

$$\hat{\Theta} = argmin_\Theta \left(\hat{M} - \frac{1}{S} \sum_{s=1}^{S} \hat{m}^s(\Theta) \right)' W \left(\hat{M} - \frac{1}{S} \sum_{s=1}^{S} \hat{m}^s(\Theta) \right) \qquad \text{(A.3)}$$

where $\hat{M}$ denotes the vector of empirical moments and $\hat{m}^s(\Theta)$ denotes the vector of simulated moments in simulation s given parameter vector Θ. We simulate the model $S = 20$ times on each iteration of the estimation algorithm. The algorithm is terminated when the relative change in the SMM objective function value over the preceding 20 iterations is less than or equal to 1e-6.

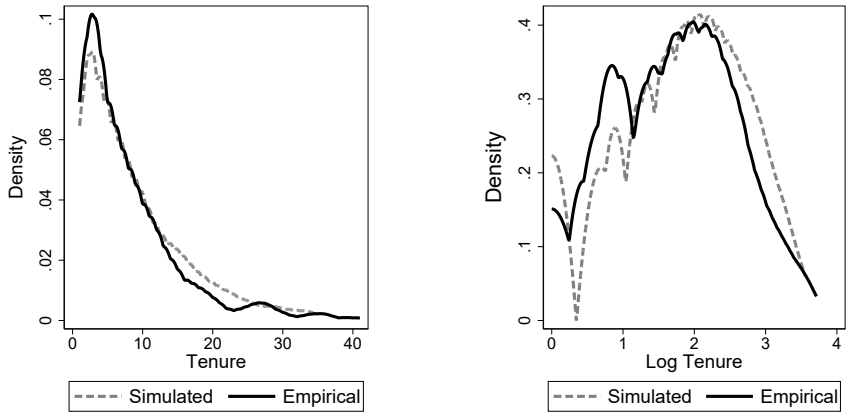
A.3.1 Initial Conditions

Since our data is left-censored, we control for the data's initial conditions by first simulating the model until we match the initial distribution of log tenure in the data, for every iteration of the estimation algorithm. Concretely, we match the first two moments of the 1996 distribution of log tenure given by:

TABLE A.4: Moments of Initial Tenure Distribution

	Mean ($\mu_{\tau,96}$)	Variance ($\sigma^2_{\tau,96}$)
$log(tenure_{1996})$	1.74	.780

Define $\gamma_{96} \equiv [\mu_{\tau,96}, \sigma^2_{\tau,96}]$ and define $\hat{\gamma}(t) \equiv [\hat{\mu}_{\tau,t}, \hat{\sigma}^2_{\tau,t}]$ as the vector containing the moments of the simulated tenure distribution in simulation period t. We begin the simulation in $t = 1$, where each firm hires an initial CEO and the tenure distribution is a single mass point at 1, and let it run until the Euclidian distance between γ_{96} and $\hat{\gamma}(t)$ approaches zero. After 40 years the tenure distribution is fairly stable. We choose to simulate the model for 50 periods and begin collecting simulated data in period 51. Figure A.1 compares the simulated tenure distribution after 50 years of decision making with the initial empirical tenure distribution at 1996:



(a) Tenure (b) Log Tenure

FIGURE A.1: Fit of Initial Tenure Distribution

A.3.2 Moments

We use a vector of 38 moments in the data to estimate the second-stage parameters in Table A.5. In this section we briefly discuss the relationship between moments and model parameters.

TABLE A.5: Model Parameters

Notation	Definition
$\mu_{O\theta}$	Mean of population distribution of outsider match quality
$\mu_{I\theta}$	Mean of population distribution of insider match quality
$\mu_{R\theta}$	Mean of population distribution of related match quality
σ^2_θ	Variance of population distribution of match quality
σ^2_η	Variance of idiosyncratic shocks to profitability
σ^2_{sI}	Variance of insider candidate signals
σ^2_{sR}	Variance of related candidate signals
ρ	Persistence in firm profitability
c	Monetary cost of turnover (forced or voluntary)
π	Non-pecuniary cost from firing a CEO
α_{FC}	Related preference (FC firms)
α_{NFC}	Related preference (NFC firms)
p	Baseline probability of a related candidate being available
p_s	Aditional probability of a related candidate being available conditional on a related predecessor

To pin down the parameters of the voluntary turnover process, we match the coefficients of the equation:

$$Pr(v_{jit} = 1) = \frac{exp(\beta_1 \tau_{jit} + \beta_2 \tau^2_{jit} + \gamma_m + \gamma_a)}{1 + exp(\beta_1 \tau_{jit} + \beta_2 \tau^2_{jit} + \gamma_m + \gamma_a)} \tag{A.4}$$

where γ_m and γ_a are fixed effects for CEO type and age category respectively. The next set of moments are coefficients of the pooled regression:

$$y_{jit} = \lambda_0 + \lambda_1 y_{jit-1} + \lambda_2 internal_{jit} + \lambda_3 related_{jit} + \lambda_4 FC_j + \Delta^{(-1)} + \Delta^{(0)} + \Delta^{(1)} + \delta_{jit} \tag{A.5}$$

We regress industry-adjusted ROA y_{jit} on its lag y_{it-1}, an indicator $internal_{jit} = 1$ if CEO j at firm i at time t is an insider or related CEO, an indicator $related_{jit} = 1$ if the CEO is related, an indicator $FC_j = 1$ if the firm is family controlled, and indicators $\Delta^{(k)} = 1$ if forced turnover occurred k years ago.[35] The intercept term λ_0 carries information about the mean of outsider match quality $\mu_{O\theta}$, while the persistence term λ_1 contains information regarding ρ. The internal and related

[35] We omit j in the lag profitability y_{it-1} as the CEO in $t-1$ might be different from j.

coefficients (λ_2, λ_3) respectively carry information about the insider and related means ($\mu_{I\theta}$, $\mu_{R\theta}$). The terms Δ^k are most informative about the monetary cost of turnover c.

Let τ^*_{ji} denote the spell length of CEO j with firm i. Define

$$\varepsilon_{ji\tau} \equiv y_{ji\tau} - \hat{\upsilon} y_{ji\tau-1} \tag{A.6}$$

$$\hat{\theta}_{ji} \equiv \frac{1}{\tau^*_{ji}} \sum_{\tau=1}^{\tau^*_{ji}} \varepsilon_{ji\tau} \tag{A.7}$$

where $\hat{\upsilon}$ is the estimated persistence parameter from the AR(1) process for IA-ROA as in Equation (2). The variable $\hat{\theta}_{ji}$ is the within-spell average of residual performance for the CEO-firm pair ji. We then compute the following moments:

$$Var(\hat{\theta}_{ji}) \tag{A.8}$$

$$Var_I(\hat{\theta}_{ji}) \tag{A.9}$$

$$Var_R(\hat{\theta}_{ji}) \tag{A.10}$$

$$\mathbb{E}\left[Var_{ji}(\varepsilon_{ji\tau})\right] \tag{A.11}$$

$Var_{ji}(\varepsilon_{ji\tau})$ is the within-spell variance of residual performance for spell ji and the expectations operator denotes the average of the variance of residual performance across all CEO spells. Moment (A.11) is informative of the variance of performance shocks σ^2_η. The moment (A.8) is the variance of $\hat{\theta}_{ji}$ across all CEOs, and helps pin down the variance of match quality in the population σ^2_θ. Additionally, we compute the variance of $\hat{\theta}_{ji}$ across all insider and related CEOs, moments (A.9) and (A.10) respectively, to help recover the variances σ^2_{sI} and σ^2_{sR}.

The next set of moments come from the following hazard regression:

$$d_{jit} = f^{(1-2)} + f^{(3-4)} + f^{(5-7)} + f^{(8+)} + \sum_k f^k * internal_{jit} + \sum_k f^k * related_{jit} + \xi_{jit} \tag{A.12}$$

The indicator d_{jit} equals one in the case of forced turnover. The terms $f^{(k)}$ are the estimated probability of forced turnover occurring at tenure k. We include interaction terms to capture differences in turnover patterns among the different classes of CEOs. The hazards are informative about the non-pecuniary firing cost π_0, while the interaction terms $f^k * internal_{jit}$ are informative about σ^2_{sI}. The more uncertainty over CEO quality there is at the time of hire, the higher the likelihood of forced turnover. Hence, differences in firing rates across CEO types is indicative of different levels of uncertainty. Additionally, the assumption that π_0 is only incurred following forced turnover while c is incurred following both forced and voluntary turnover helps to separately identify the

two. The interaction terms $f^k * related_{jit}$ capture the difference in firing rates between insider and related CEOs, and thus are informative of the related preference parameters α_{FC} and α_{NFC}.

Lastly, we match the insider and related hiring probabilities, as well as the related to related transition probability. We compute these statistics separately for family-controlled ($\phi_i = 1$) and non-family-controlled firms ($\phi_i = 0$). Let h^I_{it} and h^R_{it} be indicators equal to one if conditional on turnover, firm i hires an insider or related CEO, respectively. We match the following eight moments:

$$\begin{gathered}\mathbb{E}[h^R_{it} \,|\, \phi_i = 1] \;\; \mathbb{E}[h^R_{it} \,|\, \phi_i = 0] \;\; \mathbb{E}[h^R_{it} \,|\, \phi_i = 1 \;\&\; m_{it-1} = R] \\ \mathbb{E}[h^I_{it} \,|\, \phi_i = 1] \;\; \mathbb{E}[h^I_{it} \,|\, \phi_i = 0] \;\; \mathbb{E}[h^R_{it} \,|\, \phi_i = O \;\&\; m_{it-1} = R]\end{gathered} \tag{A.13}$$

The probabilities of related hires helps to identify the related availability probability p, and the difference in related hiring frequency between FC and NFC firms carries information about the difference of the flow preference parameters α_{FC} and α_{NFC}. The related to related transition probabilities are informative of the additional related probability p_s, and variation in transition probabilities by firm type provides further information about the difference of α_{FC} and α_{NFC}.

A.3.3 Standard Errors

For true parameter values Θ and consistent estimate $\hat{\Theta}$, we have the following asymptotic distribution (Duffie and Singleton, 1993):

$$\sqrt{n}(\hat{\Theta} - \Theta) \rightarrow^d N(0, avar(\hat{\Theta})) \tag{A.14}$$

Define $g(\Omega)$ as:

$$g(\Omega) = \hat{M} - \frac{1}{S}\sum_{s=1}^{S} \hat{m}^s(\Theta) \tag{A.15}$$

Where $\hat{M}$ is the vector of empirical moments, $\hat{m}^s(\Theta)$ is the vector of simulated moments given parameter values Θ in simulation s, and S is the total number of simulations. $avar(\hat{\Theta})$ can then be expressed as:

$$avar(\hat{\Theta}) = (1 + \frac{1}{S})(\frac{\partial g(\Theta)}{\partial \Theta} W \frac{\partial g(\Theta)}{\partial \Theta'})^{-1} \tag{A.16}$$

where $\frac{\partial g(\Theta)}{\partial \Theta}$ is the jacobian of the moment vector with respect to the structural parameters, W is the optimal weighting matrix, and S is the number of simulations. We approximate the jacobian

using:

$$\frac{\partial \hat{g}_m(\Theta)}{\partial \Theta_p} = \frac{g_p(\hat{\Theta} + h_p) - g_p(\hat{\Theta})}{h_p} \tag{A.17}$$

for each moment m and parameter p. h_p is the perturbation size for parameter which we set to 1% of the absolute value of the parameter estimate. The standard errors are then obtained as the square root of the diagonal elements of the matrix:

$$(1 + \frac{1}{S})(\frac{\partial \hat{g}(\Theta)}{\partial \Theta} \hat{W} \frac{\partial \hat{g}(\Theta)}{\partial \Theta'})^{-1} \tag{A.18}$$

where $\hat{W}$ is the sample counterpart of the optimal weighting matrix.

A.3.4 Additional Details on Model Fit

TABLE A.6: Voluntary Turnover Fit

	Simulated Coefficient	Empirical Coefficient	SE	t-stat
Constant	-1.98	-2.03	(.107)	-.453
$tenure_{jit}$	.065	.097	(.014)	2.38
$tenure^2_{jit}$	-.002	-.003	$(5.1e^{-4})$	-2.14
$\bar{a}_{jit} = 1$	-1.92	-2.03	(.390)	-.276
$\bar{a}_{jit} = 2$	-1.72	-1.83	(.082)	-1.29
$\bar{a}_{jit} = 3$	-.320	-.471	(.077)	-1.96
$related_{jit}$	-.011	-.547	(.104)	-5.17
$insider_{jit}$	.010	.120	(.059)	1.87

Notes: t-statistics are reported to measure fit. They are computed as the difference in the empirical moment from the simulated moment divided by the standard error of the empirical moment.

TABLE A.7: ROA Regression Fit

$$y_{jit} = \lambda_0 + \lambda_1 y_{jit-1} + \lambda_2 internal_{jit} + \lambda_3 related_{jit} + \Delta^{(-1)} + \Delta^{(0)} + \Delta^{(1)} + \delta_{jit}$$

	Simulated Coefficient	Empirical Coefficient	SE	t-stat
Constant	.136	-.325	(.075)	-6.12
y_{ijt-1}	.782	.815	(.010)	3.39
FC_j	.094	.203	(.203)	.538
$internal_{ijt}$	.166	.351	(.091)	2.04
$related_{ijt}$	-.290	-.142	(.127)	1.17
$\Delta^{(-1)}$	-3.36	-1.38	(.406)	4.86
$\Delta^{(0)}$	-4.40	-3.01	(.353)	3.93
$\Delta^{(1)}$	-1.42	-.264	(.364)	3.18

Notes: t-statistics are reported to measure fit. They are computed as the difference in the empirical moment from the simulated moment divided by the standard error of the empirical moment.

TABLE A.8: Hazard Regression Fit

$$d_{ijt} = h^{(1-2)} + h^{(3-4)} + h^{(5-7)} + h^{(8+)} + \sum_k h^k * insider_{ijt} + \sum_k h^k * family_{ijt} + \eta_{ijt}$$

	Simulated Coefficient	Empirical Coefficient	SE	t-stat
$h^{(1-2)}$	.028	.019	(.003)	-2.85
$h^{(3-4)}$	.056	.039	(.005)	-3.88
$h^{(5-7)}$	.043	.037	(.004)	-1.38
$h^{(8+)}$	.024	.022	(.002)	-1.04
$h^{(1-2)} \times insider_{ijt}$	-.017	-.007	(.004)	2.59
$h^{(3-4)} \times insider_{ijt}$	-.036	-.011	(.006)	4.38
$h^{(5-7)} \times insider_{ijt}$	-.024	-.009	(.005)	2.91
$h^{(8+)} \times insider_{ijt}$	-.009	-.004	(.003)	1.76
$h^{(1-2)} \times family_{ijt}$	-.010	.002	(.008)	1.46
$h^{(3-4)} \times family_{ijt}$	-.016	-.024	(.005)	-1.63
$h^{(5-7)} \times family_{ijt}$	-.015	-.019	(.006)	-.813
$h^{(8+)} \times family_{ijt}$	-.009	-.009	(.003)	-.147

Notes: t-statistics are reported to measure fit. They are computed as the difference in the empirical moment from the simulated moment divided by the standard error of the empirical moment.

TABLE A.9: Hiring Probability Fit

	Simulated Coefficient	Empirical Coefficient	SE	t-stat
Related insider (FC)	.101	.118	(.037)	.478
Unrelated insider (FC)	.536	.553	(.057)	.286
Related insider (NFC)	.050	.040	(.005)	-2.07
Unrelated insider (NFC)	.570	.580	(.011)	.962
R-to-R transition (FC)	.314	.333	(.136)	.145
R-to-R transition (NFC)	.149	.157	(.034)	.216

Notes: t-statistics are reported to measure fit. They are computed as the difference in the empirical moment from the simulated moment divided by the standard error of the empirical moment.

References

Anderson, Ronald C. and David M. Reeb, "Founding-Family Ownership and Firm Performance: Evidence from the S&P 500," *The Journal of Finance*, 2003, *58* (3), 1301–1328.

_ and _ , "Board Composition: Balancing Family Influence in S&P 500 Firms," *Administrative Science Quarterly*, 2004, *49* (2), 209–237.

Ang, James S., Rebel A. Cole, and James Wuh Lin, "Agency Costs and Ownership Structure," *The Journal of Finance*, 2000, *55* (1), 81–106.

Arcidiacono, Peter and Robert A. Miller, "Identifying Dynamic Discrete Choice Models off Short Panels," *Journal of Econometrics*, 2020, *215* (2), 473–485.

Barth, Erling, Trygve Gulbrandsen, and Pål Schønea, "Family ownership and productivity: the role of owner-management," *Journal of Corporate Finance*, 2005, *11* (1), 107–127.

Bennedsen, Morten, Francisco Peréz-González, and Daniel Wolfenzon, "Do CEOs Matter? Evidence from Hospitalization Events," *Journal of Finance*, 2020, *75* (4), 1877–1911.

_ , Kasper Meisner Nielsen, Francisco Peréz-González, and Daniel Wolfenzon, "Inside the Family Firm: The Role of Families in Succession Decisions and Performance," *The Quarterly Journal of Economics*, 2007, *122* (2), 647–691.

Bertrand, Marianne and Antoinette Schoar, "Managing with Style: The Effect of Managers on Firm Policies," *The Quarterly Journal of Economics*, 2003, *118* (4), 1169–1208.

_ and _ , "The Role of Family in Family Firms," *Journal of Economic Perspectives*, June 2006, *20* (2), 73–96.

_ , Simon Johnson, Krislert Samphantharak, and Antoinette Schoar, "Mixing family with business: A study of Thai business groups and the families behind them," *Journal of Financial Economics*, 2008, *88* (3), 466–498.

Bloom, Nick, Raffaella Sadun, and John Reenen, "Recent Advances in the Empirics of Organizational Economics," *Annual Review of Economics*, 02 2010, *2*.

Claessens, Stijn, Simeon Djankov, and Larry H.P Lang, "The separation of ownership and control in East Asian Corporations," *Journal of Financial Economics*, 2000, *58* (1), 81–112.

Demarzo, Peter M. and Yuliy Sannikov, "Learning, Termination, and Payout Policy in Dynamic Incentive Contracts," *The Review of Economic Studies*, 07 2017, *84* (1), 182–236.

Duffie, Darrell and Kenneth J. Singleton, "Simulated Moments Estimation of Markov Models of Asset Prices," *Econometrica*, 1993, *61* (4), 929–952.

Ellul, Andrew, Marco Pagano, and Fabiano Schivardi, "Employment and Wage Insurance within Firms: Worldwide Evidence," *The Review of Financial Studies*, 09 2017, *31* (4), 1298–1340.

Ferraro, Valeria, "Media Focus and Executive Turnover: Consequences for Female Leadership," *Working Paper*, 2021.

Hermalin, Benjamin E., "Trends in Corporate Governance," *The Journal of Finance*, 2005, *60* (5), 2351–2384.

Hincapié, Andrés, "Where are the Young Entrepreneurs? A Study of Entrepreneurship over the Life Cycle," *International Economic Review*, 2020, *61* (2), 617–681.

Huson, Mark R., Robert Parrino, and Laura T. Starks, "Internal Monitoring Mechanisms and CEO Turnover: A Long-Term Perspective," *The Journal of Finance*, 2001, *56* (6), 2265–2297.

Jenter, Dirk and Fadi Kanaan, "CEO Turnover and Relative Performance Evaluation," *The Journal of Finance*, 2015, *70* (5), 2155–2184.

Kaplan, Steven N. and Bernadette A. Minton, "How Has CEO Turnover Changed?," *International Review of Finance*, 2012, *12* (1), 57–87.

Lins, Karl V., Paolo Volpin, and Hannes F. Wagner, "Does Family Control Matter? International Evidence from the 2008–2009 Financial Crisis," *The Review of Financial Studies*, 01 2013, *26* (10), 2583–2619.

Lippi, Francesco and Fabiano Schivardi, "Corporate control and executive selection," *Quantitative Economics*, 2014, *5* (2), 417–456.

Lyman, Noah, "Reputation, Entrenchment, and Dynamic Managerial Incentives," Job Market Paper, UNC 2023.

Magnac, Thierry and David Thesmar, "Identifying Dynamic Discrete Decision Processes," *Econometrica*, 2002, *70* (2), 801–816.

Morck, Randall, Andrei Shleifer, and Robert Vishny, "Management Ownership and Market Valuation: An Empirical Analysis," *Journal of Financial Economics*, 1988, *20*, 293–315.

Murphy, Kevin, "Executive compensation," *Handbook of Labor Economics*, 1999, *3, Part B*, 2485–2563.

Parrino, Robert, "CEO Turnover and Outside Succession, A Cross-Sectional Analysis," *Journal of Financial Economics*, 1997, *46* (2), 165–197.

Peréz-González, Francisco, "Inherited Control and Firm Performance," *American Economic Review*, 2006, *96* (5), 1559–1588.

Peters, Florian S. and Alexander F. Wagner, "The Executive Turnover Risk Premium," *The Journal of Finance*, 2014, *69* (4), 1529–1563.

Prat, Julien and Boyan Jovanovic, "Dynamic contracts when the agent's quality is unknown," *Theoretical Economics*, 2014, *9* (3), 865–914.

Quigley, Timothy, Donald Hambrick, Vilmos Misangyi, and Alessandra Rizzi, "CEO Selection as Risk-taking: A New Vantage on the Debate About the Consequences of Insiders Versus Outsiders," *Strategic Management Journal*, 04 2019, *40.*

Smith, Brian F. and Ben Amoako-Adu, "Management succession and financial performance of family controlled firms," *Journal of Corporate Finance*, 1999, *5* (4), 341–368.

Taylor, Lucian, "Why Are CEOs Rarely Fired? Evidence from Structural Estimation," *The Journal of Finance*, 2010, *65* (6), 2051–2087.

Villalonga, Belen and Raphael Amit, "How do Family Ownership, Control and Management Affect Firm Value?," *Journal of Financial Economics*, 2006, *80* (2), 385–417.

_ **and** _ , "How Are U.S. Family Firms Controlled?," *The Review of Financial Studies*, 08 2008, *22* (8), 3047–3091.

Weisbach, Michael S., "Outside directors and CEO turnover," *Journal of Financial Economics*, 1988, *20*, 431–460.