

The ties that bind:

implicit contracts and the adoption of management technology in the firm

Renata Lemos
World Bank

Daniela Scur*
Cornell University

This draft: November 2019.
[\[Latest version here\]](#)

Abstract: We investigate how implicit contracts between firm managers and employees are linked to the adoption of productivity-enhancing organizational practices. We collect new data on ownership successions and show the first causal evidence that maintaining family control leads to lower adoption of managerial best practices. We use gender composition of the outgoing CEO’s children as identifying variation at the succession point. We explore firm “reputation costs” as a novel mechanism constraining investment in management, and build a new proxy using data on eponymy — firms named after the family name. We find suggestive evidence that implicit contracts matter for management adoption.¹

Total word count: 15,910 words.

Abstract word count: 99 words.

JEL Codes: D22, M11, M12.

*Corresponding author. Email: dscur@cornell.edu. Cornell University, Dyson School of Applied Economics and Management. Warren Hall, Cornell University, Ithaca, NY 14853-7801. Phone number: 1 (607) 255-1611

¹We would like to thank CAF, Santander Travel Awards, Nuffield College, PEDL, The IGC, the World Bank and the IADB for funding various parts of this project. We also thank Carlos Lessa and the IBGE staff for access to the Brazilian Industrial Census (PIA). We are indebted to Morten Bennedsen, Katarzyna Bilicka, Steve Bond, Ian Crawford, Zoe Cullen, Dave Donaldson, Bob Gibbons, Simon Quinn, Kalina Manova, Meg Meyer, Andrea Prat, Anna Sanktjohanser, Abhijeet Singh, Margaret Stevens and seminar audiences at the 2019 NBER Organizational Economics spring meeting, Oxford, Stanford, UNSW, Empirical Management Conference, CSAE Conference, RES Conference, RES Junior Symposium, Barcelona GSE Summer Forum, CCC at Bocconi, PacDev-Riverside, University of Toronto, Lindau Nobel Laureate Meetings, Cornell University and Duke University for very helpful comments and discussions. We particularly thank Nick Bloom, Raffaella Sadun and John Van Reenen for their support over the years. A previous version of this paper has been circulated as “*All in the family? CEO choice and firm organization.*”

1 Introduction

Organizational structures such as management practices are crucial for firm productivity, growth and survival. This stylized fact holds across a range of industries and ownership types, shown with correlational (Bloom et al., 2015; Bloom and Van Reenen, 2007; Rasul and Rogger, 2018), and causal evidence (Bloom et al., 2013; Bruhn et al., 2018; Giorcelli, 2019; Gosnell et al., 2019). It is thus a puzzle that we still observe a wide distribution in the adoption of organizational best practices across firms (Syverson, 2011). Between countries, much of the difference has been attributed to different levels of competition, government regulation and bi-lateral trust (Bloom et al., 2012a,b). Within countries, however, the differences can only be partially explained by tangible factors, including firm characteristics such as size, industry and ownership, or manager characteristics such as education or experience (Bennett et al., 2016; Bloom et al., 2014).

In this paper, we shed new light on the puzzle of why firms fail to adopt better organizational practices despite the clear link with productivity, and focus on the role of intangible factors (Blader et al., 2019). Specifically, we bridge the literature on empirical management with that of within-firm relational contracts,² and provide the first empirical evidence that the strength of the relational contract between senior managers and their employees can influence the decision to adopt organizational best practices. We focus on a set of firms that offer an ideal setting for this purpose: dynastic family firms.³ These are firms where members of the founding family own a controlling share of the voting rights and have appointed a second-generation family member to serve as the CEO. They are ideal for three reasons: first, they are the most common type of firm in the world, accounting for over half of mid- and large-sized firms.⁴ Second, it is well-established that family firms treat their workers differently,⁵ and there is evidence that workers behave differently when employed by family firms relative to non-family firms.⁶ This evidence suggests family firms have implicit commitments between managers and workers (i.e. stronger relational contracts). Third, focusing on dynastic firms allows us to compare firms where a relational contract continued through succession (when control is kept within the same family) and where the relational contract was broken (when control is not kept in the same family).

We account for the endogeneity of CEO appointments in dynastic successions by collecting a unique new dataset on the family characteristics of the outgoing CEOs for 912 firms that had at least one succession across 13 countries. We exploit exogenous variation in the gender composition of the outgoing CEO’s children as an instrument for dynastic CEO succession. Our results

²For example, Baker et al. (1994, 2002b); Barron and Powell (2019); Halac and Prat (2016).

³Bandiera et al. (2015) also focus on family firms to study matches between firms and managers.

⁴See La Porta et al. (2002, 1997). We further show that dynastic firms account for about a quarter of firms in our sample of medium and large manufacturing firms.

⁵For example, family-run firms provide better job security as a compensating differential for lower wages (Bach and Serrano-Velarde, 2015; Bassanini et al., 2013), fare better in difficult labor relations settings (Mueler and Philippon, 2011) and provide more within-firm wage insurance (Ellul et al., 2017).

⁶For example, (Bennedsen et al., 2016) show family firm workers have lower absenteeism rates.

suggest that outgoing CEOs who, conditional on number of children, have at least one son are approximately 30 percentage points more likely to hand down the firm to a family member than those who had no male children. The IV results suggest that a succession to a family CEO leads to 0.96 standard deviations lower adoption of structured management practices relative to firms with successions to non-family CEOs. This difference implies a productivity deficit of about 10%.⁷

There is a large body of theoretical work on why firms adopt fewer structured management practices, though far fewer empirical studies. In the theory literature, [Rivkin \(2000\)](#) and [Gibbons and Henderson \(2012\)](#) outline the four principal reasons as problems of (a) perception — they lack awareness of their failings; (b) inspiration — even with awareness, they lack the skills to enact change; (c) motivation — they have insufficient incentive to adopt new practices; (d) persuasion — they lack the coalition required to push change. While there is empirical evidence for the first two,⁸ we show that proxy measures of perception and skills fail to fully explain the gap in the adoption of structured management between firms. Thus, we push forward on the “motivation” channel.

To guide the empirical analysis this mechanism, we present a simple conceptual framework considering the role of relational contracts in adoption of structured management practices. The key aspect of this framework is that all CEO types face an industry cost of disciplining workers (say, high unionization rates), but only family CEOs face an additional cost stemming from relational employment commitments to the workers — which we refer to as “reputation costs”.⁹ Our contribution is linking this higher cost of disciplining workers to the CEOs’ (dis)incentive to adopt structured management practices,¹⁰ and building new proxy measures to empirically explore this channel. We use a large firm-level data provider, BvD Orbis, to classify firms as eponymous — a firm bearing the family name — and use it as a proxy for firm-specific “reputation exposure”. We use the WMS data on unionization to build a proxy for industry-level costs of disciplining workers.

Our framework delivers two key predictions, and we find empirical evidence to support them. First, firms with high reputation exposure (i.e. eponymous firms) will adopt fewer structured management practices: this is because the reputation exposure makes it relatively more costly for firms to discipline workers and reduces the motivation to invest in structured management. Second, industries with higher costs of disciplining workers (i.e. higher labour power) will have fewer firms under both types of CEOs adopting structured management practices. While the results we present here are specific to family firms, our findings can be generalizable to other types

⁷We also document the positive relationship between structured management and productivity specifically for family firms in Appendix A.3. Prior OLS estimates placed the management deficit at about half of this size ([Bloom et al., 2014](#)), suggesting the impact of family control on adoption of management practices has been underestimated.

⁸See [Bennett et al. \(2016\)](#); [Bloom et al. \(2014\)](#) for lack of perception, and ([Bandiera et al., 2018](#); [Bennedsen et al., 2007](#); [Bloom et al., 2013](#)) for lack of skills.

⁹[Belenzon et al. \(2017\)](#) show that reputation matters for founder effort, and use eponymy as a measure of reputation exposure for founder-run firms.

¹⁰The literature on family firms has long suggested that the objective function of a family CEO includes a measure of private benefit of control, and seeks to maximize the longevity of the firm as well as personal and family utility ([Burkart and Panunzi, 2006](#); [Gomez-Mejia et al., 2011](#); [Villalonga and Amit, 2006](#))

of firms. For example, firms that operate in environments where local political favor is vital may, similar to family firms, weigh the importance of implicit employment commitments more heavily than other firms. Our results are among the first pieces of empirical evidence of this barrier to organizational change.

This paper contributes to the literature on the determinants of technology adoption in firms, and the importance of CEOs. [Atkin et al. \(2017\)](#) show that misalignment of incentives between senior management and workers is a key barrier to technology adoption, and ([Bertrand and Schoar, 2003](#)) show that CEO “style” matters for corporate behavior and performance. Dynastic firms tend to do worse in terms of productivity ([Bandiera et al., 2019](#); [Bertrand and Schoar, 2006](#); [Perez-Gonzales, 2006](#)), and [Bennedsen et al. \(2007\)](#) use a similar IV strategy to show a causal relationship between a succession to a family CEO and lower productivity in Denmark. We add to these results by documenting the first causal estimates of the effect of dynastic CEO succession on the adoption of a management technology measured by the level of structured management practices. We bridge the largely theoretical literature on managerial attention and relational contracts ([Baker et al., 1994, 2002b](#); [Barron and Powell, 2019](#); [Chassang, 2010](#); [Halac and Prat, 2016](#)) with the new empirical results in the internal firm organization literature started with [Bloom and Van Reenen \(2007\)](#).

We also contribute to the literature on internal firm organization and its link to performance, overcoming the common limiting factor of data availability for private firms by collecting new data and building first links across multiple rich datasets. A number of papers find that there are large differences in the quality of management across firms and CEO types ([Bandiera et al., 2019, 2018](#); [Bertrand and Schoar, 2003](#); [Black and Lynch, 2001](#); [Ichniowski et al., 1997](#); [Kaplan and Sorensen, 2017](#)),¹¹ and that this variation is linked with differences in performance ([Bloom et al., 2013, 2016](#); [Bloom and Van Reenen, 2007, 2010](#); [Giorcelli, 2019](#)).

2 Data

2.1 Ownership and Control History data: The Ownership Survey

We designed and implemented a new survey to collect data on the full history of ownership and control changes in a firm from its inception — the Ownership Survey (OS). For those firms that were founded by a single founder or founding family, we also collect information on their family characteristics and the family’s involvement in the management of the firm; the first such detailed data for non-Scandinavian countries.¹² To determine ownership, the interviewees are asked to

¹¹Further, [Alexopoulos and Tombe \(2012\)](#) estimates the effect of managerial process innovations on the economy and find a significant positive relationship between a managerial shock and aggregate output and productivity. In fact, they suggest that these innovations are “generally as important as non-managerial ones” in the macro context.

¹²Existing M&A databases, such as Zephyr and SDC Platinum only collect data on changes in *ownership* rather than changes in control. Beyond the Scandinavian matched census datasets, however, there are no datasets with

describe who ultimately owns the firm, and the interviewer is instructed to probe enough to find out who the single largest shareholder is and whether they own more than 25% of the controlling shares.¹³ A firm is classified as “dynastic family control” when the founding family members are the majority shareholders, and a family member (second generation onwards) is appointed as the CEO. A Firm classified as “non-family control” include private and public firms with non-family appointed CEOs, and family-owned firms who appointed a non-family member as the CEO.

The sample of the World Management Survey served as the base for the Ownership Survey, as we leveraged the rapport and trust already built with the managers at the firm to ask relatively more intrusive questions. The sample includes manufacturing firms with more than 50 employees that participated in the 2013 and 2014 waves of the WMS. In the combined dataset, we have CEO information for 2710 firms across 18 countries, 1711 of which are not first-generation founder firms and have had at least one succession of control. Out of these firms, a total of 912 firms have had at least one succession that originated from a founder or family CEO as well as full information on the family history of the outgoing CEOs (920 succession points in total). This latter sample is the one we use for the IV analysis.¹⁴

2.2 Organizational data: the World Management Survey

2.2.1 Measurement

The World Management Survey is a unique dataset that includes levels of structured management practices from over 15,000 manufacturing managers collected from 2004 to 2018 across 36 countries. The WMS methodology uses double-blind surveys to collect data on firms’ adoption of structured management practices and focuses on medium- and large-sized firms (between 50 and 5,000 employees).¹⁵ The median firm size across countries ranges between 200 and 300 employees.

The WMS uses an interview-based evaluation tool, initially developed by an international consulting firm, that defines and scores a set of 18 basic management practices on a scoring grid ranging from one (“little/no formal practices”) to five (“best practice”). A high score represents a best practice in the sense that a firm that adopts the practice will, on average, increase their productivity. The tool can be interpreted as measuring the level of structured managerial practices in three broad areas: operations and monitoring, target-setting and people management practices.

The survey measures the extent to which these managerial structures are implemented in the firm, asking managers to describe their practices through open-ended questions rather than inviting their opinion. Analysts then independently evaluate these practices on a set scale. Thus, the

successions of *control* (rather than simply ownership) that include family characteristics of CEOs. More information on www.ownershipsurvey.org.

¹³We use the 25% of voting shares as a threshold for majority ownership, as in other similar surveys. This is a higher threshold of ownership relative to La Porta et al. (1997), set at 10%.

¹⁴Table A1 in the Data Appendix details the sample.

¹⁵The WMS methodology was first described in Bloom and Van Reenen (2007). Survey instrument available at www.worldmanagementsurvey.org.

survey captures the degree of adoption and usage rather than the manager’s opinions, abstracting from possible mood influences of individual managers. Beyond the key measure of managerial structures at the plant level, the survey also collects a wealth of information on the firm, including firm location, size, and other organizational features. Financial performance data is not collected, but the dataset includes firm identifiers that allow for matching with external databases such as Bureau van Dijk (Orbis and Amadeus), Compustat and individual statistical agencies.

Our main measure of the adoption of structured management in a firm is the standardized average management score across the 18 topics. We also use standardized scores of the sub-indices (operations and monitoring, target-setting and people management) as additional variables of interest.¹⁶ The standard deviation of the full WMS sample is approximately 0.66 points.

For the exploration into the mechanisms, we build a proxy for the common cost of disciplining workers using the WMS data on the share of unionization across industries. The survey collects the share of workers that are unionized in that firm, as well as the 2-digit SIC industry code. We average the share of workers that are unionized across each industry within countries to build the proxy.

2.2.2 Validation

The WMS score has been shown to be robustly linked to good firm outcomes in several prior studies.¹⁷ Studies using the WMS have found one standard deviation higher score on the management measure to be correlated with 15% higher TFP, 16% higher sales, higher likelihood of growth, lower likelihood of exit, higher innovation, and higher energy efficiency. (Bloom et al., 2010, 2012a; Bloom and Van Reenen, 2007; Bloom et al., 2012c). We confirm that the relationship holds in the sub-sample of only family firms, but as the focus of this paper is not on the management and productivity relationship, we leave the table and further discussion in the Appendix.

2.3 Reputation Cost data: eponymy match from Bureau van Dijk

2.3.1 Measurement

To build a proxy of the costs firms face when disciplining workers, we rely on the empirical results in the literature that suggest family firms offer a stronger, albeit informal, long-term employment commitment to their employees. While all family firms can be exposed to punishment if they renege on this commitment, *eponymous family firms* — that is, firms that bear the founding family’s name — are more relatively exposed. Eponymy in founder firms is linked to both reputation benefits and costs (Belenzon et al., 2017), and there are myriad accounts in the news media of eponymous firms being particularly singled out for worker-related decisions.¹⁹ Thus, we proxy reputation exposure

¹⁶We have tested the results using the Principal Component in place of the average, and the results are robust.
¹⁷18

¹⁹For example, see Saltzman (2018).

with eponymy, assigning a value of 1 to the indicator when the firm’s name includes the CEO’s last name. The assumption is that eponymous firms face a higher cost of disciplining workers as a result of their level of exposure.

2.3.2 Validation

To validate this measure, we match the WMS firms to the Brazilian employer-employee dataset (RAIS), which includes the full roster of formal employment in the country.²⁰ RAIS records the reason for separation for each job spell, allowing us to differentiate between workers who quit and those who were fired. If eponymy is a reasonable proxy for firm reputation exposure, we would expect eponymous family firms to respond less to a negative shock, that is, fire fewer workers. Using the 2009 recession as a shock, we compare the firing rates for eponymous and non-eponymous firms pre- and post-recession. Eponymous firms do not change their firing rates significantly, but non-eponymous family firms significantly increase their firing rates post-recession. While we are not looking to establish causality, the pattern corroborates the anecdotal evidence that eponymy is a reasonable proxy for reputation exposure. We provide further details in Appendix A.1.1.²¹

3 Dynastic CEOs and structured management

3.1 Descriptive evidence: OLS results

Starting with the full WMS sample, Figure 1 shows the cumulative distribution of structured management adoption (henceforth management) for each type of firm we study. It is clear that the distribution of management for firms under dynastic control is stochastically dominated by firms under non-family control — both those owned by private individuals as well as family-owned (though professionally-run). The difference is statistically significant at the 1% level.

[Figure 1 about here.]

To verify the external validity of the sample of firms we use in our IV analysis, Table 1 shows the baseline relationship between each ownership type and our main management measure across the sub-samples. We start with the full World Management Survey sample, and subsequently restrict our sample to only firms that have had at least one succession of control and are in the countries we study, and end with only the firms in our IV sample. We run the following OLS specification:

²⁰For more on management and the RAIS dataset, see [Cornwell et al. \(2019\)](#).

²¹The firms in the sample are medium-sized firms employing approximately 200 employees, and thus are not solely employing their family members. The implicit employment commitment should be seen as one between non-family members.

$$M_{isc} = \alpha + \beta_1' \mathbf{Family}_{isc} + \beta_2' \mathbf{NonFamily}_{isc} + \theta' \mathbf{V}_i + \omega_s + \delta_c + u_{isc} \quad (1)$$

where M_{isc} is the z-scored management index for firm i in industry s in country c . \mathbf{Family}_{isc} and $\mathbf{NonFamily}_{isc}$ are vectors of dummy variables indicating five ownership and control categories broken down as follows: family firms are subdivided into “dynastic family CEO” and “founder CEO,” while non-family firms are subdivided into “privately owned, professional CEO” and “family owned, professional CEO.”²² The reference category omitted here is “dispersed shareholders”. \mathbf{V}_i is a vector of controls for firm i , including the log of the number of employees, log of firm age and a dummy variable for multinational status. The survey noise controls are a set of interviewer dummies, manager’s tenure, day of week, survey year and interview duration. We also include country and industry fixed effects.

[Table 1 about here.]

Columns (1) and (2) use the full WMS sample. Column (1) shows the baseline relationship between the sub-categories of ownership and management, while Column (2) includes firm and noise controls. Firm and noise controls account for a substantial share of the variation, though still leaving a substantial share unexplained. The estimates in Column (2) suggest that the average family owned, family CEO firm has 0.269 standard deviations lower adoption of management relative to the average dispersed shareholder firm. We also observe that firms with non-family CEOs, either family or privately owned, also adopt fewer management practices relative to dispersed shareholder firms.

We include a parameter test of the equality of coefficients within and between the two broader categories of firm control and provide results at the bottom of the table. Much of the difference between professionally-managed firms is accounted for by firm and industry controls, but that is not true of the difference between family-run firms and non-family-run firms.

In Columns (3) we restrict the sample to only firms within the countries covered in our main sample, and exclude first generation (founder-run) family firms. The coefficients remain largely unchanged. In Column (4) we restrict the sample to only the firms included in our IV analysis. Our final dataset is a cross-section of 920 successions from 912 firms, where we have information on the outgoing CEO’s family characteristics. The coefficients in Column (4) are similar to those in Column (3) and (2).

The purpose of this exercise is to show that the pattern of lower adoption of structured management practices in dynastic family CEO firms is persistent across several sub-samples of the data. The OLS coefficient in Column (4) suggests that family-controlled firms in our analysis sample have, on average, 0.23 standard deviations worse management than dispersed shareholder

²²We refer to non-family CEOs as professional CEOs not to discredit family CEOs who are also professional CEOs, but rather to be clear about what we are considering the primary identity of each firm leader.

firms. This is equivalent to about 35% of the standard deviation in the full management dataset. A number of factors could be driving this relationship, however. For example, if only the worst family firms have family CEOs because the worst firms often fail to recruit a professional CEO, the pattern we observe would be similar but the cause would not be the family CEO. We overcome the limitation of a correlational analysis, with an instrumental variables approach.

3.2 Causal evidence: IV results

It is not clear ex-ante which direction the OLS bias could run. On the one hand, if the firm is able to stay alive as a family controlled firm in a competitive environment, there is some positive productivity shock that could drive both CEO choice and management adoption. On the other hand, if only the worst firms are passed down to family CEOs because the worst firms fail to recruit a professional CEO, we would expect a negative bias. There could also be reverse causality, as different control structures — say, less concentrated control — could lead firms to adopt more structured management practices, but it is also possible that more structured management allows firms to transition to control structures with, less concentration of control at the top.

We explore the gender composition of the children of the outgoing CEO of dynastic firms as a source of variation in family control that is exogenous to the adoption of management practices. We use three main variations of this instrument: (a) an indicator for whether there was at least one son among the children, conditional on the number of children (b) the number of sons, conditional on number of children, and (c) an indicator for whether the first child was male. The rationale is that if the outgoing CEO has a male child, the firm is more likely to remain under family control.²³ In the context of the countries in our sample, where larger families are the norm, the gender of the first child is less predictive of family succession than the incidence of male children in the family.

We are essentially comparing *stayers* with *switchers*: the stayers are firms that stay in family control, while the switchers are firms that were founded by a founding family, but have since switched into non-family control. We use the measure of managerial structures adopted that is contemporaneous with the CEO presiding during that time, and the information on the gender of the preceding CEO’s children as the identifying variation. Table 2 shows the main descriptive statistics of the sample of firms used, and the difference in means between family and non-family firms.

[Table 2 about here.]

The dependent variable of the first stage of our two stage least squares (2SLS) strategy is $FamilyCEO_i$, an indicator that takes a value of 1 when the firm has a dynastic family CEO and 0 when it does not. The first instrument, $HADSONS_i$ is an indicator that takes a value of 1 if

²³The gender of the first child instrument has been used by [Bennedsen et al. \(2007\)](#) with Danish data of family firms CEOs, for example.

the outgoing CEO had at least one son. The second instrument, $SONS_i$ is the number of sons the outgoing CEO had, entered as a step function. The third instrument, $FIRSTSON_i$, is an indicator that takes a value of 1 if the outgoing CEO had a male first child and 0 if not. \mathbf{X}_i is the vector of firm controls. The first stage equations are as follows:

$$\begin{aligned} FamilyCEO_i &= \alpha_A + \rho_A HADSONS_i + \vartheta_A children_i + \boldsymbol{\eta}'_A \mathbf{X}_i + \nu_{A,i} \\ FamilyCEO_i &= \alpha_B + \sum_{j=1}^3 \rho_j SONS_j + \vartheta_B children_i + \boldsymbol{\eta}'_B \mathbf{X}_i + \nu_{B,i} \\ FamilyCEO_i &= \alpha_C + \rho_C FIRSTSON_i + \boldsymbol{\eta}'_C \mathbf{X}_i + \nu_{C,i} \end{aligned} \quad (2)$$

The second stage regression of the effect of dynastic family succession on the adoption of structured management practices is:

$$M_i = \alpha_D + \beta_D \widehat{FamilyCEO}_i + \vartheta_D children_i + \boldsymbol{\phi}' \mathbf{X}_i + \epsilon_i \quad (3)$$

where M_i is a measure of managerial structures in the firm, $\widehat{FamilyCEO}_i$ is the predicted value from the first stage regression and \mathbf{X}_i is the set of firm-level controls. The coefficient of interest is β_D : the effect of dynastic family control on the adoption of structured management practices.

3.2.1 IV validity

Instrument informativeness The results from the first stage are meaningful and statistically significant, suggesting our instruments are informative. The strongest instrument is the indicator for whether the outgoing CEO had at least one son, conditional on the total number of children. We find that in the countries we study, the gender of the *first child* is not the strongest a predictor of family succession, with a male first child predicting only a 15 percentage points higher chance of family control. Figure 2 breaks down the firm control succession by the number of sons of the former CEO, providing a “visual first stage” and reinforcing the idea that outgoing CEOs who had at least one son are more likely to pass control of the firm dynastically.

[Figure 2 about here.]

Exclusion restriction Our identifying assumption is that the gender of the CEO’s children is not directly related to any part of the measure of adoption of structured management practices. In our preferred specification, one concern is that CEOs who preferred male heirs could continue having children until they “successfully” had a son to pass the firm to. The exclusion restriction would not hold if this desire for a male heir led both to a larger family (more sons) and also to systematically more (or fewer) managerial structures. We address this potential issue in two ways.

First, we consider the relationship between desire for a male child and total number of children. At the time of data collection, all CEOs had completed their family size choices, which allows us to

consider whether there is evidence of gender-picking in the sample. If the founders in our sample made family size decisions based on a desire to have at least one son, we could expect family sizes to be smaller if the first child was “successfully” male. Figure 3 plots the distribution of number of children conditional on the first child being male or female and shows that selectivity of family size based on the gender of the children is not a concern in the countries studied here.²⁴

[Figure 3 about here.]

Second, we need that the level of managerial structures not be directly vulnerable to biases related to higher effort. It is plausible that founders who were determined to conceive a male heir to take on the family business may also put in more effort in their business. Outcomes such as sales or profits are susceptible to this type of bias, as simply increasing effort could yield better such outcomes. Management, however, is an outcome that simple CEO effort or sheer determination have a much less straightforward effect, as drivers of management are not as simple as increasing effort.²⁵ For suggestive evidence, we can exploit a set of firms in the WMS for which there is panel data covering a change in ownership and control between survey waves. There are 796 firms in the WMS with a management score for the founder-run firm as well as at least one subsequent score for the same firm under different control. We find no difference between the average score of founder-run firms that had a dynastic succession relative to non-dynastic success.²⁶

3.2.2 Main IV results

Table 3 shows a summary of the OLS and IV results. Column (1) repeats the OLS regression in Table 1 for comparison. Column (2) shows the reduced form using the instrument from our preferred IV specification.

[Table 3 about here.]

Panel B of Table 3 shows the first stage results for our three main instruments in Columns (3) to (5), and repeats the results for the instrument in our preferred specification in Columns (6) to (8). Column (3) suggests that, controlling for number of children, a firm is approximately 30

²⁴The p-value of the Kolmogorov Smirnov test of equality of distributions is 0.784. For a sub-sample of families, we have the order of the gender of the children and could run a model to check for stopping rules: that is, whether the probability of the last child being male or female was related to the first child being male or female. We do not find evidence of stopping rules in this sample. In terms of the IV specification using the gender of the first child, this is rather “purely” random since the countries we are including in the analysis do not have histories of selective abortion or infanticide. The countries in our sample are historically catholic. See (Bassi and Rasul, 2017) for evidence on faith-based fertility decisions in Brazil, for example.

²⁵See Bandiera et al. (2019) for evidence on CEO time use. Evidence in Lemos, (*mimeo*) suggests that the effect of quality and quantity of tertiary education on management is significant, but small. Bloom et al. (2013) note that one of the reasons firm owners in their Indian experiment were not adopting better management practices was lack of information — they simply did not know that they were poorly managed or how to adopt these practices.

²⁶In fact, firms that later had a non-dynastic succession had a slight edge. Figure A3 in the Appendix shows the average score for the founder-run firm by the type of succession recorded in the subsequent wave.

percentage points more likely to have a succession to a family CEO if the outgoing family CEO had at least one son.²⁷

Column (4) shows the results of using the number of sons as instruments, entered as a step function. The coefficients and significance levels are similar to those of the preferred specification, predicting an approximate 29 percentage points likelihood of a firm staying in the family if there is exactly one son in the family, and similarly for higher numbers of sons. We report the Hansen’s J statistic resulting from the Sargan-Hansen test of over-identifying restrictions and cannot reject the joint null hypothesis that the instruments are valid. However, this specification seems to have weaker instruments than our preferred specification.

Column (5) uses the gender of the first child as the instrument. The coefficient suggests that having a male first child is associated with an approximately 15 percentage points higher probability of the firm remaining under family control. As the majority of outgoing CEOs in our sample had multiple children, it is a less informative instrument relative to the others. Thus, our preferred specification is Column (3).

Panel A of Table 3 shows the second stage results, along with the OLS and reduced form results. Column (3) shows that a succession to a family CEO leads to 0.96 standard deviations lower adoption of structured management, significant at the 5% level. The coefficients of the different iterations of the IVs are similar to each other. Although the coefficient in Column (5) is not significant, the sign and magnitude of the coefficient are broadly consistent with that of the other iterations of the instrument, albeit imprecise.

Columns (6) to (8) show the results for each management sub-index. The coefficients are broadly consistent with the overall management measure, suggesting the negative relationship between a family succession of control and management is not driven by one singular area. Appendix A.4 describes a set of robustness checks, such as including sampling weights and different functional forms of the instrumental variables. The results are broadly consistent in terms of coefficient magnitude and direction of sign.

4 Mechanisms: why do dynastic family CEOs adopt fewer structured management practices?

The result that dynastic family firms adopt fewer productivity-enhancing management structures leaves us with a puzzle. If adoption of structured management leads to better firm performance,

²⁷ The Kleibergen-Paap Wald F-statistic test for weak instruments is 23.78, well above the Stock and Yogo (2005) 10% maximal IV size critical value. This suggests that the largest relative bias of the 2SLS estimator relative to OLS for our preferred specification is 10%. The Kleibergen-Paap Wald statistic (Kleibergen, 2002; Kleibergen and Paap, 2006) is the heteroskedasticity-robust analogue to the first-stage F-statistic, and we report this value because we use clustered standard errors at the firm level. Although there are no critical values specifically for the K-P statistic, we report the Stock and Yogo (2005) critical values for the Cragg-Donald Wald F-statistic to facilitate comparison.

why are firms not adopting them? Two general mechanisms often ascribed to family firms — lower levels of skill and lack of awareness of under-performance — fail to explain the full gap in the adoption of structured management.²⁸

Further, neither of these mechanisms reflect fundamental characteristics of family CEOs that may help explain systematic differences between the incentive structure of family and non-family CEOs. In this section we explore how the strength of implicit employment commitments in family-run firms may affect their incentives to adopt structured management practices.

4.1 Conceptual framework: dynastic CEOs and reputation

We base our framework on two established literatures: (1) on relational contracts, where, as a result of incomplete contracts, the relationship between principals and agents matters for continued production (Baker et al., 2002a; Barron and Powell, 2019; Chassang, 2010; Halac and Prat, 2016); and (2) on managerial attention, where, for example, Halac and Prat (2016) show that managers can invest in “attention” to motivate employees by recognizing good performance, but that there are deteriorating dynamics unless the attention and monitoring is used to recognize bad performance. We rely on the theoretical results from this work and describe a conceptual framework to guide the empirical exploration of how stronger implicit contracts in dynastic firms hinder the adoption of management technology.

Consider a setting with a firm owner, a CEO and a set of workers. There are two types of CEOs: a family CEO and a non-family, “professional” CEO. The owner chooses between the two types: $Mg \in \{FAM, PRO\}$. A CEO has two choices to make: an investment choice, i , and a disciplining choice, d . The investment choice is a binary investment choice $i \in \{i_y, i_n\}$, where i_y denotes investment in the monitoring technology (i.e. adopting structured management practices) and i_n denotes no investment. The disciplining choice is also a binary choice $d \in \{D_n, D_y\}$, where D_n denotes keeping the worker, and D_y denotes firing (disciplining) the worker.²⁹ An action for the worker is a binary effort choice, $e_w \in \{\bar{e}_w, \underline{e}_w\}$, where \bar{e}_w denotes high effort and \underline{e}_w denotes low effort. The worker is hired by the CEO and is not a family member.

Workers can be of high or low ability: high ability workers have low cost of effort and will opportunistically choose to exert low effort (shirk) depending on the chance of getting caught. Low ability workers have high cost of effort and will never choose high effort.³⁰ For any given

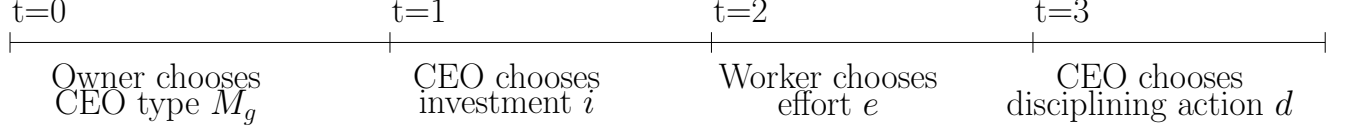
²⁸For arguments relating to family CEOs’ lower levels of skill see Bennedsen et al. (2007); Bloom et al. (2013); Perez-Gonzales (2006). For arguments relating to lack of awareness of managerial under-performance see Gibbons and Roberts (2013); Rivkin (2000). For empirical evidence from founder CEO firms see Bennett et al. (2016). The WMS includes two relevant measures of awareness and skills: the first proxy variable comes from a self-scoring question asked at the end of the WMS interview: “On a scale of 1 to 10 and excluding yourself, how well managed do you think the rest of your firm is?” The answer is then re-scaled to match the 1 to 5 scale of the WMS. The second proxy variable is an indicator for whether the manager has a college degree.

²⁹The most extreme form of discipline is being fired, so we use fires going forward. However, the concept would also apply to disciplining more generally, as long as it is considered harsh.

³⁰An alternative way to view this is that, even if low ability workers try to exert effort, it will never appear to

industry, there is a share of workers η of high ability, and a share of workers $(1 - \eta)$ of low ability.

The timeline of actions is presented below. The owner moves first, at $t = 0$, to choose a CEO type. At $t = 1$, the appointed CEO chooses whether to invest in a monitoring technology or not. At $t = 2$ the workers decide whether to exert effort. At $t = 3$ production is realized and total profits generated. The CEO then decides whether to keep or fire workers and final payoffs are realized.



All decisions by the owner and the CEOs are public information. The worker’s effort choice is observable by the CEO only if the CEO invested in the monitoring technology, otherwise the worker’s decisions are private. Individual worker ability is private information, but within each industry the share of workers who are high ability, η , is public information.

Although investing in monitoring technology allows the CEO to observe the worker’s effort level, the technology has a fixed cost and it is only worth adopting if the CEO uses the information to discipline the low-effort workers. All CEOs incur a fixed “industry cost” of firing workers, but the family CEO also has an implicit commitment with their workers that implies an additional cost of disciplining. We do not assume that professional CEOs are of higher ability than family CEOs, distinguishing this framework from others such as [Burkart and Panunzi \(2006\)](#). We purposefully allow CEOs to be of similar ability to consider alternative explanations behind the observed lower levels of profitability under the assumption that they are making rational and informed choices.³¹ Profits are a function of worker effort and are higher when CEOs invest in monitoring because it induces higher worker effort.³² We leave the details of the model in [Appendix B](#) and present the equilibrium outcomes and predictions.

Equilibrium outcomes Our framework’s predictions rest on two key parameters that affect the motivation for investing in a structured management technology: the family reputation exposure c_f , the industry-level cost of disciplining workers ℓ_c . This framework helps explain why we might see the distribution of management practices present in the data, where both family CEO firms and professional CEO firms have high and low adoption of management across the distribution, but the distribution of management adoption in professional CEO firms stochastically dominates

be high effort and thus cannot be recognized as such.

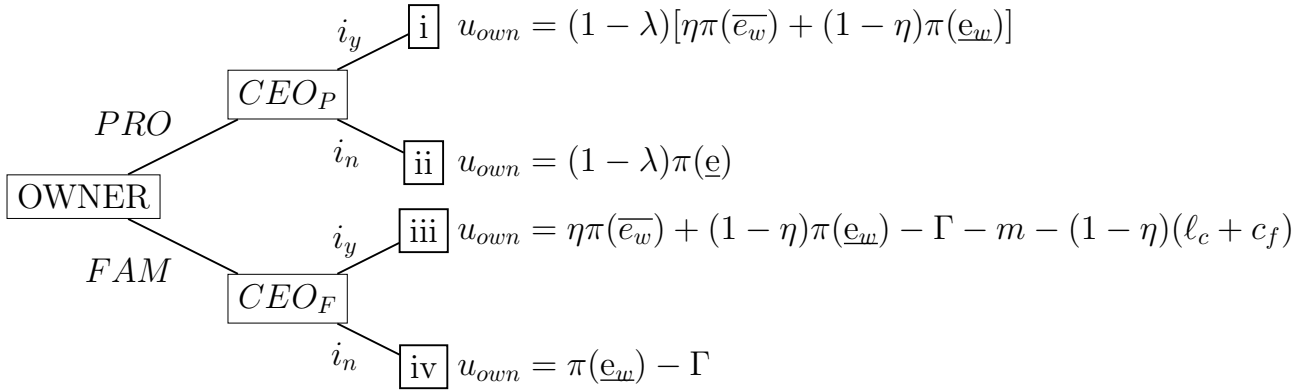
³¹Conceptually, the model includes a cost of adoption of the management technology, m that is assumed to be equal across family and non-family CEOs. If we allow m to have a distribution that differs across CEO types, it is possible to take into account skills as well. It would only exacerbate the results of the model, rather than change the direction of the effects.

³²This framework does not preclude family firm workers from having higher intrinsic motivation, as suggested by [Bennedsen et al. \(2019\)](#), where they find evidence that workers in Danish family firms have lower absenteeism. An alternative way to think about the effort choices of workers is that low ability workers are simply not able to exert the high level of effort, despite wanting to or trying to.

the family CEO distribution. In equilibrium, for a given set of environment parameters (η , λ , ℓ , m and f), there will be four types of firms:

- i. Professional CEO, adopts monitoring;
- ii. Professional CEO, does not adopt monitoring;
- iii. Family CEO, adopts monitoring;
- iv. Family CEO, does not adopt monitoring.

The owner's decision tree is outlined below.



A key difference in this conceptual framework relative to the literature is that we do not need to assume that family CEOs are of lower ability, but rather that they are responding to differential costs of investing in a type of monitoring technology because of the unique structure of implicit commitments with their employees.

In Figure 4 we impose $\eta = 0.5$ and $\lambda = 0.3$ as a graphical example of a potential solution to the framework.³³ In this environment, firms in high unionization industries are evenly split between family control and professional control, and neither adopt monitoring as it is too costly for either type of CEO to discipline workers. The decision of whether to have family or professional control is solely based on the cost of control (i.e. how much private benefit is accrued to the family CEO).

Firms in the low unionization environment are split between family and professional CEOs who adopt monitoring, and family CEOs who do not adopt monitoring. The reputation exposure divides the family CEOs, with those above a threshold f finding it too costly to discipline workers and thus choosing not to adopt monitoring. The cost of control divides family CEOs from professional CEOs, who in this low unionization range always adopt monitoring. Notably, some family CEOs who would have accrued some private benefit (those below 0 on the cost of control range) still choose to have professional control. This is because the additional profit after hiring a professional CEO who will adopt monitoring is higher than their private benefit of control. In Appendix B we

³³ Assuming half of the workforce is high ability and the share of profits that need to be paid in wages to the professional CEO is 30%.

provide additional examples under different environments to illustrate how varying the stock of high-skilled workers and professional CEO compensation affects the share of firms of each type.

[Figure 4 about here.]

Our framework yields the following relevant predictions:

Prediction 1: *Family CEO firms with high firm-specific disciplining costs will adopt fewer structured management practices.*

Prediction 2: *Both family and non-family CEOs in industries with higher overall disciplining costs will adopt fewer structured management practices.*

Corollary: *Family CEO firms with high firm-specific disciplining costs in higher overall disciplining cost industries will adopt even fewer structured management practices.*

4.2 Empirical evidence: dynastic CEOs and reputation

We run the following OLS specification:

$$M_{isc} = \alpha + \beta_1 \left\{ \begin{array}{c} \text{Dynastic}_{isc} \\ \text{DynE}_{isc} + \text{DynNE}_{isc} \end{array} \right\} + \theta_1 \text{Skills}_{isc} + \theta_2 \text{Know}_{isc} + \theta_3 N_{isc} + \omega_s + \delta_c + u_{isc} \quad (4)$$

M_{isc} is each of the management indices for firm i in industry s and country c : overall management, people management, operations management. As the conceptual framework speaks to the relationship between managers and workers, our preferred specification is with the people management index as the outcome variable.³⁴ Dynastic_{isc} is an indicator that takes the value of 1 if the firm is a second(-plus) generation family firm with a family CEO in place. DynE_{isc} is an indicator that takes a value of 1 if the firm is a dynastic firm, and also is named after the family name. DynNE_{isc} is an indicator that takes a value of 1 if the firm is a dynastic firm, but the firm is *not* named after the family. Skills and Know are the proxies for skills (log of the share of employees with college degrees) and knowledge (the manager's self-score). N is a set of firm-level controls, including firm size (log of employment), firm age, multinational status and unionization rate. The sample includes all WMS firms with matching director information from Orbis, though we exclude first-generation (founder-run) firms.³⁵ We describe the results pertaining to each prediction in turn.

³⁴The people management score measures the adoption of practices relating to monitoring, selection and reward of workers within the firm.

³⁵We create inverse probability weights from the full sample to partially account for the selection of firms with director information available.

Prediction 1: We find evidence that is consistent with prediction 1, where we would expect eponymous dynastic firms to have lower people management scores. Columns (1) and (2) of Table 4 show the results from the first specification with the simple dynastic family firm indicator on overall management practices. The first column shows the baseline correlation and column (2) adds the skills and knowledge proxies as controls. Column (1) suggests that a dynastic family firm adopts 0.135 standard deviations fewer structured management practices relative to the reference category of all other private firms, and, as discussed earlier, the coefficient barely moves when the skills and knowledge proxies are included. Column (3) shows the results from the second specification, where we split the dynastic firm indicator into an indicator for *eponymous* dynastic firms and one for *non-eponymous* dynastic firms. The results suggest that the negative relationship between the adoption of overall structured practices is being driven by the eponymous dynastic firms, with a substantially more negative coefficient relative to non-eponymous firms. The p-value of the test of equality between the coefficients is 0.066.

[Table 4 about here.]

Columns (4) through (6) and (7) through (9) repeat the exercise with people management and operations management, finding a similar pattern. The deficit in people management, in particular, seems to be primarily driven by eponymous firms. This is consistent with our prediction, as the people management index is the closest in spirit to our conceptual framework. Further, the deficit is evident across the distribution: Figure 5 shows that the cumulative distribution function for people management for non-eponymous firms stochastically dominates the distribution for eponymous firms.³⁶

[Figure 5 about here.]

Prediction 2: We find evidence that is consistent with prediction 2, where we would expect both dynastic and non-dynastic firms in industries with high unionization rates to adopt fewer structured management practices. In Figure 6 we show the results of a locally weighted regression with bandwidth 0.5. There is a clear negative relationship between share of unionized workers in a firm and their people management score. Consistent with the conceptual framework, this is the case for both types of firms.

[Figure 6 about here.]

Corollary: A corollary prediction is that there is an interaction effect, where eponymous firms in high unionization environments adopt even fewer structured management practices. To illustrate the marginal effects, in Figure 7 we use the log of industry unionization and plot the marginal effect

³⁶The Kolmogorov-Smirnov test of equality has a p-value(0.000).

at each level of unionization rates for eponymous and non-eponymous firms. Non-eponymous firms have a slight negative slope, while eponymous firms have a much steeper slope. The difference between them is statistically significant at the higher levels of unionization. Taken together, the descriptive evidence in this section provides empirical support for the arguments proposed in the conceptual framework.

[Figure 7 about here.]

5 Conclusion

The core economic question in this paper relates to the determinants of organizational choice within firms and the consequences of these decisions. More specifically, we consider how intangible factors such as the relational contracts between employees and managers may affect the decisions on the adoption of structured management practices. We focus on the case of dynastic family firms, as this type of firm that accounts for a large share of economic activity and offers a unique quasi-experimental break in the relational contract at the succession point. We use an instrumental variables approach, relying on variation on the gender of the outgoing CEOs children to identify the causal effect of a dynastic succession (i.e. continuation of the relationship) on the adoption of structured management practices. We find a significant negative effect of dynastic control, amounting to almost a full standard deviation lower adoption of structured management practices. Given the established relationship between structured management and productivity (about 10% higher per SD), this is a economically substantial effect and within the range as the main productivity deficit results of dynastic family firms in Denmark (Bennedsen et al., 2007).

We consider the possible mechanisms behind this under-adoption of structured management in dynastic firms, focusing on the strength of a possible relational contract. There is a rich, yet rarely overlapping, theoretical literature on relational contracts and empirical literature on measurement and adoption of organizational practices. This paper bridges the two literatures by borrowing the insights from the theoretical work and considering how relational contracts may act as barriers to adoption of structured management practices.

There are important policy implications from this work. As family firms make up a large share of mid-sized firms, which in turn make up a large share of employment, improving productivity in these firms is a key policy goal. Process innovation such as improved managerial practices has been shown to be an important driver of aggregate productivity but, naturally, only if firms and organizations adopt the innovative processes. Thus improving such practices as well as increasing their adoption rates can be an important lever to improving productivity. There are binding institutional constraints that bar many firm owners in emerging economies from seeking professional leadership, for example, when rule of law is wanting and the risk of expropriation is too high to be worth appointing a professional CEO. There are also strong preferences from firm owners to

being their firm's CEO that counter-balance losses in productivity. So if we accept family control is the necessary (or preferred) control structure for many firms, it is crucial to understand what may be the barriers to adoption of better management practices *within family firms*. Implicit commitments between family managers and their workers should factor into both how management upgrading projects are presented to prospective firm managers as well as into the expected take-up and long-term adherence of such improvements.

References

- Alexopoulos, Michelle and Trevor Tombe (2012) “Management Matters,” *Journal of Monetary Economics*, Vol. 59, pp. 269–285.
- Atkin, David, Azam Chaudhry, Shamyla Chaudry, Amit K. Khandelwal, and Eric Verhoogen (2017) “Organizational Barriers to Technology Adoption: Evidence from Soccer-Ball Producers in Pakistan*,” *The Quarterly Journal of Economics*, Vol. 132, pp. 1101–1164.
- Bach, Laurent and Nicolas Serrano-Velarde (2015) “CEO identity and labour contracts: theory and evidence from CEO transitions,” *Journal of Corporate Finance*, Vol. 33.
- Baker, George, Robert Gibbons, and Kevin Murphy (2002a) “Relational contracts and the theory of the firm,” *The Quarterly Journal of Economics*, Vol. 1, pp. 39–84.
- Baker, George, Robert Gibbons, and Kevin J. Murphy (1994) “Subjective Performance Measures in Optimal Incentive Contracts,” *The Quarterly Journal of Economics*, Vol. 109, pp. 1125–1156.
- (2002b) “Relational Contracts and the Theory of the Firm,” *The Quarterly Journal of Economics*, Vol. 117, pp. 39–84.
- Bandiera, Oriana, Luigi Guiso, Andrea Prat, and Raffaella Sadun (2015) “Matching Firms, Managers, and Incentives,” *Journal of Labor Economics*, Vol. 33, pp. 623–681.
- Bandiera, Oriana, Stephen Hansen, Andrea Prat, and Raffaella Sadun (2019) “CEO Behavior and Firm Performance,” *Journal of Political Economy* (forthcoming).
- Bandiera, Oriana, Renata Lemos, Andrea Prat, and Raffaella Sadun (2018) “Managing the Family Firm: Evidence from CEOs at Work,” *Review of Financial Studies*, Vol. 31, pp. 1605–1653.
- Barron, Daniel and Michael Powell (2019) “Policies in Relational Contracts,” *American Economic Journal: Microeconomics*, Vol. 11, pp. 228–49.
- Bassanini, Andrea, Thomas Breda, Eve Caroli, and Antoine Rebrioux (2013) “Working in Family Firms: Paid Less but More Secure? Evidence from French Matched Employer-Employee Data,” *ILR Review*, Vol. 66, pp. 433–466.
- Bassi, Vittorio and Imran Rasul (2017) “Persuasion: A Case Study of Papal Influences on Fertility-Related Beliefs and Behavior,” *American Economic Journal: Applied Economics*, Vol. 9, pp. 250–302.
- Belenzon, Sharon, Aaron Chatterji, and Brendan Daley (2017) “Eponymous Entrepreneurs,” *American Economic Review*, Vol. 107, pp. 1638–55.

- Bennedsen, M, K.M Nielsen, F Perez-Gonzales, and D Wolfenzon (2007) “Inside the Family Firm: The Role of Families in Succession Decisions and Performance,” *The Quarterly Journal of Economics*, Vol. 122, pp. 647–691.
- Bennedsen, Morten, Margarita Tsoutsoura, and Daniel Wolfenzon (2016) “Ownership structure and employee effort: evidence from family firms,” September, Mimeo.
- (2019) “Drivers of Effort: Evidence from Employee Absenteeism,” *Journal of Financial Economics*, Vol. 133, pp. 658–684.
- Bennett, Victor Manuel, Megan Lawrence, and Raffaella Sadun (2016) *Are Founder CEOs Good Managers?*, pp. 153–185: University of Chicago Press.
- Bertrand, Marianne and Antoinette Schoar (2003) “Managing with style: the effect of managers on firm policies,” *The Quarterly Journal of Economics*, Vol. 118, pp. 1169–1208.
- (2006) “The Role of Family in Family Firms,” *Journal of Economic Perspectives*, Vol. 20, pp. 73–96.
- Black, Sandra E. and Lisa M. Lynch (2001) “How To Compete: The Impact Of Workplace Practices And Information Technology On Productivity,” *The Review of Economics and Statistics*, Vol. 83, pp. 434–445.
- Blader, Steven, Claudine Gartenberg, and Andrea Prat (2019) “The Contingent Effect of Management Practices,” *The Review of Economic Studies*.
- Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts (2013) “Does Management Matter? Evidence from India,” *The Quarterly Journal of Economics*, Vol. 128, pp. 1–51.
- Bloom, Nicholas, Chris Genakos, Ralf Martin, and Raffaella Sadun (2010) “Modern Management: Good for the Environment or Just Hot Air?” *Economic Journal*, Vol. 120, pp. 551–572.
- Bloom, Nicholas, Chris Genakos, Raffaella Sadun, and John Van Reenen (2012a) “Management Practices Across Firms and Countries,” *The Academy of Management Perspectives*, Vol. 26, pp. 12–33.
- Bloom, Nicholas, Renata Lemos, Raffaella Sadun, and John Van Reenen (2015) “Does Management Matter in Schools?” *The Economic Journal*, Vol. 125, pp. 647–674.
- Bloom, Nicholas, Renata Lemos, Raffaella Sadun, Daniela Scur, and John Van Reenen (2014) “The New Empirical Economics of Management,” *Journal of the European Economic Association*, Vol. 12.

- Bloom, Nicholas, Aprajit Mahajan, David McKenzie, and John Roberts (2018) “Do Management Interventions Last? Evidence from India,” Working Paper 24249, National Bureau of Economic Research.
- Bloom, Nicholas, Raffaella Sadun, and John Van Reenen (2012b) “The Organization of Firms Across Countries,” *The Quarterly Journal of Economics*, Vol. 127, pp. 1663–1705.
- Bloom, Nicholas, Raffaella Sadun, and John Van Reenen (2016) “Management as a Technology?” Working Paper 22327, National Bureau of Economic Research.
- Bloom, Nicholas and John Van Reenen (2007) “Measuring and Explaining Management Practices Across Firms and Countries,” *The Quarterly Journal of Economics*, Vol. 122, pp. 1351–1408.
- Bloom, Nicholas and John Van Reenen (2010) “Why do Management Practices Differ across Firms and Countries?” *Journal of Economic Perspectives*, Vol. 24, pp. 203–224.
- Bloom, Nicholas, John Van Reenen, and Raffaella Sadun (2012c) “Management as a technology?” Technical report, London School of Economics.
- Bruhn, Miriam, Dean Karlan, and Antoinette Schoar (2018) “The Impact of Consulting Services on Small and Medium Enterprises: Evidence from a Randomized Trial in Mexico,” *Journal of Political Economy*, Vol. 126, pp. 635–687.
- Burkart, Mike and Fausto Panunzi (2006) “Agency conflicts, ownership concentration, and legal shareholder protection,” *Journal of Financial Intermediation*, Vol. 15, pp. 1–31.
- Chassang, Sylvain (2010) “Building Routines: Learning, Cooperation, and the Dynamics of Incomplete Relational Contracts,” *American Economic Review*, Vol. 100, pp. 448–65.
- Cornwell, Christopher, Ian M. Schmutte, and Daniela Scur (2019) “Building a productive workforce: the role of structured management,” CEPR Discussion Papers 13908, CEPR.
- Ellul, Andrew, Marco Pagano, and Fabiano Schivardi (2017) “Employment and Wage Insurance within Firms: Worldwide Evidence,” *The Review of Financial Studies*, Vol. 31, pp. 1298–1340.
- Gibbons, Robert and Rebecca Henderson (2012) “What Do Managers Do?” in Robert Gibbons and John Roberts eds. *The Handbook of Organizational Economics*: Princeton University Press.
- Gibbons, Robert and John Roberts (2013) *The Handbook of Organizational Economics*: Princeton University Press.
- Giorcelli, Michela (2019) “The Long-Term Effects of Management and Technology Transfers,” *American Economic Review*, Vol. 109, pp. 1–33.

- Gomez-Mejia, Luis, Cristina Cruz, Pascual Berrone, and Julio de Castro (2011) “The Bind that ties: Socioemotional wealth preservation in family firms,” *Academy of Management Annals*, Vol. 5, pp. 653–707.
- Gosnell, Greer K, John A List, and Robert Metcalfe (2019) “The Impact of Managerial Practices on Employee Productivity: A Field Experiment with Airline Captains.”
- Halac, Marina and Andrea Prat (2016) “Managerial Attention and Worker Performance,” *American Economic Review*, Vol. 106, pp. 3104–32.
- Ichniowski, C, K Shaw, and G Prennushi (1997) “The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines,” *American Economic Review*, Vol. 87, pp. 291–313.
- Kaplan, Steven and Morten Sorensen (2017) “Are CEOs different? Characteristics of top managers,” NBER Working Papers 23832, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge MA 02138.
- Kleibergen, Frank (2002) “Pivotal statistics for testing structural parameters in instrumental variables regression,” *Econometrica*, Vol. 70, pp. 1781–1803.
- Kleibergen, Frank and Richard Paap (2006) “Generalized Reduced Rank Test Using the Singular Value Decomposition,” *Journal of Econometrics*, Vol. 133, pp. 97–126.
- La Porta, Rafael, Florencio Lopez-De-Silanes, Andrei Shleifer, and Robert Vishny (2002) “Investor Protection and Corporate Valuation,” *The Journal of Finance*, Vol. 57, pp. 1147–1170.
- La Porta, Rafael, Florencio Lopez de Silanes, Andrei Shleifer, and Robert Vishny (1997) “Legal determinants of external finance,” *The Journal of Finance*, Vol. 52, pp. 1131–1150.
- Levinsohn, James and Amil Petrin (2003) “Estimating production functions using inputs to control for unobservables,” *The Review of Economic Studies*, Vol. 70, pp. 317–341.
- Mueler, Holger and Thomas Philippon (2011) “Family firms and labor relations,” *American Economic Journal: Macroeconomics*, Vol. 3, pp. 218–245.
- Perez-Gonzales, Francisco (2006) “Inherited Control and Firm Performance,” *American Economic Review*, Vol. 96.
- Rasul, Imran and Daniel Rogger (2018) “Management of Bureaucrats and Public Service Delivery: Evidence from the Nigerian Civil Service,” *Economic Journal*, Vol. 128, pp. 413–446.
- Rivkin, Jan (2000) “Imitation of Complex Strategies,” *Science*, Vol. 46, pp. 824–844.

- Saltzman, Aaron (2018) “Tim Hortons heirs cut paid breaks and worker benefits after minimum wage hike, employees say.”
- Stock, James and Motohiro Yogo (2005) *Identification and Inference for Econometric Models: Essays in Honor of Thomas J Rothenberg*, Chap. Testing for Weak Instruments in Linear IV Regression, New York: Cambridge University Press.
- Syverson, Chad (2011) “What Determines Productivity?” *Journal of Economic Literature*, Vol. 49, pp. 326–365.
- Villalonga, Belen and Raphael Amit (2006) “How do family ownership, control and management affect firm value?” *Journal of Financial Economics*, Vol. 80, pp. 385–417.

Table 1: Ownership and control on structured management adoption: full WMS sample and IV sample

	(1)	(2)	(3)	(4)
	z-management	z-management	z-management	z-management
<i>Dispersed shareholders (reference category)</i>				
Family CEO				
Family owned, family CEO	-0.544*** (0.025)	-0.269*** (0.023)	-0.277*** (0.032)	-0.234** (0.106)
Founder owned, founder CEO	-0.789*** (0.024)	-0.326*** (0.024)		
Non-family CEO				
Family owned, professional CEO	-0.355*** (0.035)	-0.117*** (0.031)	-0.100** (0.041)	0.125 (0.205)
Privately owned, professional CEO	-0.265*** (0.021)	-0.116*** (0.019)	-0.117*** (0.028)	-0.237* (0.134)
Observations	15960	15960	6596	920
R^2	0.148	0.363	0.284	0.254
Noise controls		✓	✓	✓
Firm controls		✓	✓	✓
Industry controls	✓	✓	✓	✓
Sample used:	Full WMS	Full WMS	IV countries	IV firms only
Tests of equality (p-values)				
Family CEOs	0.000	0.017		
Non-family CEOs	0.009	0.996	0.663	0.086
Family vs non-family CEOs	0.000	0.000	0.000	0.051

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. All columns estimated by OLS with standard errors clustered at the firm level. All data comes from the World Management Survey. z-management is the plant-level standardized management score. Noise controls include a set of interviewer dummies, the seniority and tenure of the manager who responded, the day of the week the interview was conducted, the time of day the interview was conducted and the duration of the interview. Firm controls include average hours worked and the proportion of employees with college degrees (from the survey), plus a set of country dummies. Industry controls include a set of 2-digit SIC dummies. The base category is firms with dispersed shareholder ownership.

Table 2: Difference in means: dynastic vs. non-dynastic succession

	Family Mean	Non-family Mean	Diff in means	T Stat	Family N	Non-family N
Family characteristics						
<i>Of outgoing founder</i>						
First child = male	0.76	0.62	-0.14***	-3.62	725	176
Had at least one son	0.95	0.79	-0.16***	-5.05	732	180
# children	3.14	2.53	-0.61***	-4.43	732	180
# children first = boy	3.13	2.97	-0.15	-0.85	554	109
# boys	2.01	1.48	-0.53***	-5.61	729	179
Firm characteristics						
# employees	451.23	580.57	129.33	1.83	732	180
Firm age	50.91	45.99	-4.92*	-2.03	732	180
% of managers with degrees	54.56	67.43	12.87***	4.55	732	180
Multinational = 1	0.12	0.42	0.30***	7.82	732	180
Share in low tech industries	0.46	0.37	-0.09*	-2.22	732	180
Levels between CEO and shopfloor	3.20	3.50	0.31**	2.81	732	180
# direct reports to plant manager	7.23	7.19	-0.04	-0.10	732	180
Avg hrs/wk, manager	48.34	47.98	-0.36	-0.66	729	180
Avg hrs/wk, non-manager	42.67	42.78	0.11	0.35	728	180
# production sites, total	2.48	3.23	0.76	1.20	732	180
# production sites, abroad	0.50	1.37	0.88	1.48	732	180

Note: This table uses data from the matched World Management Survey and Ownership Survey sample used in the main Instrumental Variables specification. Data on family characteristics comes from the Ownership Survey and data on firm characteristics comes from the World Management Survey.

Table 3: IV-2SLS results for the effect of dynastic control on adoption of structured management

	OLS	Reduced Form	IV Second Stage results					
	(1) z-mgmt	(2) z-mgmt	(3) z-mgmt	(4) z-mgmt	(5) z-mgmt	(6) z-ops/monitor	(7) z-targets	(8) z-people
Family CEO = 1	-0.234** (0.106)		-0.959** (0.431)	-0.877** (0.424)	-0.531 (0.465)	-0.782* (0.451)	-0.925** (0.428)	-0.836** (0.419)
Had at least 1 son		-0.274** (0.126)						
K-P Wald F-statistic			23.78	8.287	19.97	23.78	23.78	23.78
Hansen's J statistic				1.158				
Hansen's J p-value				0.561				
IV First Stage results								
<i>Excluded instruments</i>								
Had at least 1 son			0.300*** (0.061)			0.300*** (0.061)	0.300*** (0.061)	0.300*** (0.061)
1 son				0.285*** (0.063)				
2 sons				0.305*** (0.064)				
3+ sons				0.338*** (0.069)				
First child = male					0.149*** (0.033)			
Control for family size: linear	✓	✓	✓	✓		✓	✓	✓
# Firms	912	912	912	908	902	912	912	912
# Observations	920	920	920	916	909	920	920	920
R ²	0.333	0.346	0.061	0.066	0.029	0.061	0.061	0.061

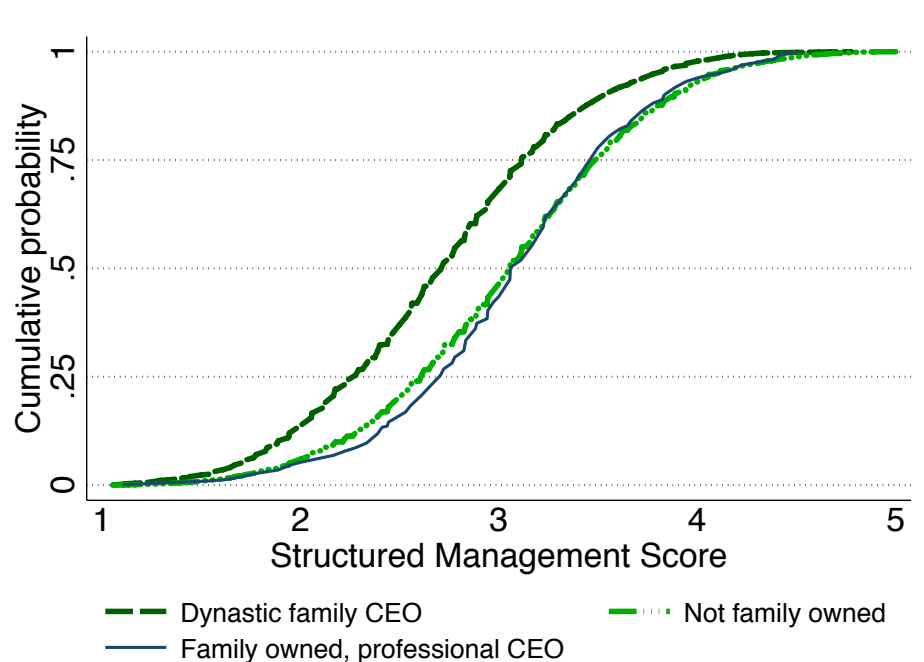
Columns (1) and (2) estimated by OLS with standard errors clustered at the firm level. Columns (3) through (8) are estimated by 2SLS. Management data comes from the World Management Survey. z-management is the plant-level standardized management score. Ownership and family history data comes from the Ownership Survey. All specifications include **firm-level controls**: average hours worked, whether the firm is listed on the stock market, a set of country dummies, and **noise controls**: set of interviewer dummies, the seniority and tenure of the manager who responded, the day of the week the interview was conducted, the time of day the interview was conducted and the duration of the interview. **Control for family size** is the total number of children of the outgoing CEO.

Table 4: Mechanisms: eponymous firms adopt fewer structured management practices

	Overall management			People management			Operations maangement		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Private firms (reference category)</i>									
Dynastic family firm	-0.135*** (0.028)	-0.134*** (0.027)		-0.093*** (0.029)	-0.092*** (0.028)		-0.140*** (0.029)	-0.139*** (0.028)	
Family: eponymous			-0.147*** (0.046)			-0.121*** (0.046)			-0.144*** (0.046)
Family: non-eponymous			-0.059** (0.028)			-0.035 (0.030)			-0.064** (0.029)
Skills control		✓	✓		✓	✓		✓	✓
Knowledge control		✓	✓		✓	✓		✓	✓
Noise and firm controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	8465	8465	8465	8465	8465	8465	8465	8465	8465
# Firms	6104	6104	6104	6104	6104	6104	6104	6104	6104
R ²	0.282	0.323	0.322	0.234	0.276	0.275	0.268	0.299	0.298
Tests of equality (p-value)									
Eponymous x non-eponymous			0.066			0.075			0.103

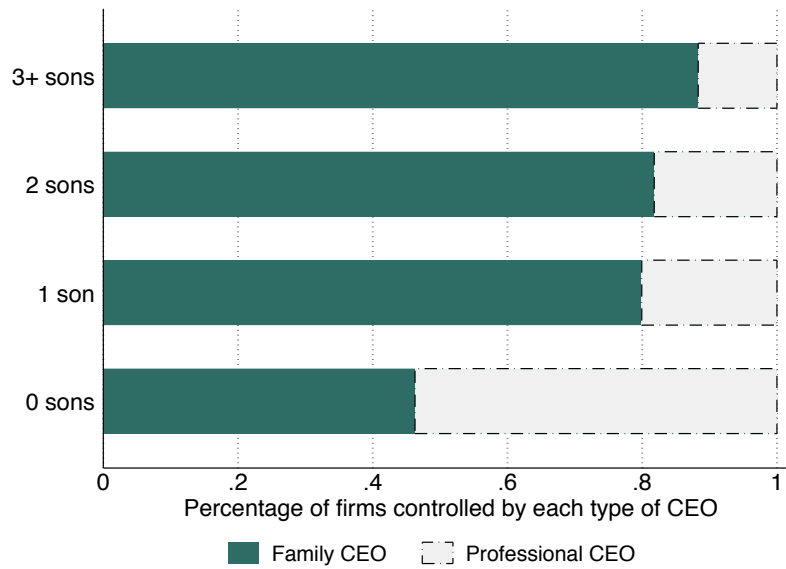
Data from the World Management Survey and Bureau van Dijk. Excludes founder firms. **Main outcome variables** are the standardized management indices: Overall management is the standardized average management score (18 topics), People management is the standardized average of the people management questions (6 topics) and Operations management is the standardized average of all non-people management questions (12 topics). **Firm controls** include: log of employment, firm age, multinational status, unionization rate. **Noise controls** include: analyst dummies, day of week of interview, manager tenure in the company, duration of the interview. **Dynastic family firm** is an indicator taking a value of 1 if the firm is a second generation+ family firm (descendants of the founder). **Family (eponymous)** is an indicator variable taking the value of 1 if the firm is named after the founding family. **Skills control** is the log of the share of employees with college degrees in the firm. **Knowledge control** is the management score the manager attributed to the firm at the end of the WMS interview. All regressions include inverse probability weights to account for the firms without director information.

Figure 1: Cumulative distribution of the adoption of structured management, by firm type



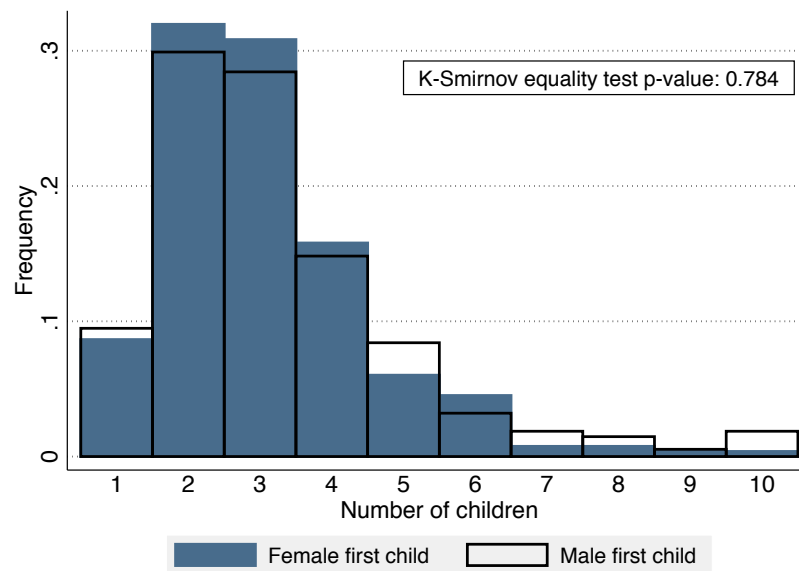
Note: World Management Survey data. Excludes founder-owned firms. Total N=12548. Not family owned N=8592. Family owned, professional CEO N =565. Family owned, family CEO N = 2700.

Figure 2: Successions from founder or family control, by number of sons of the outgoing CEO



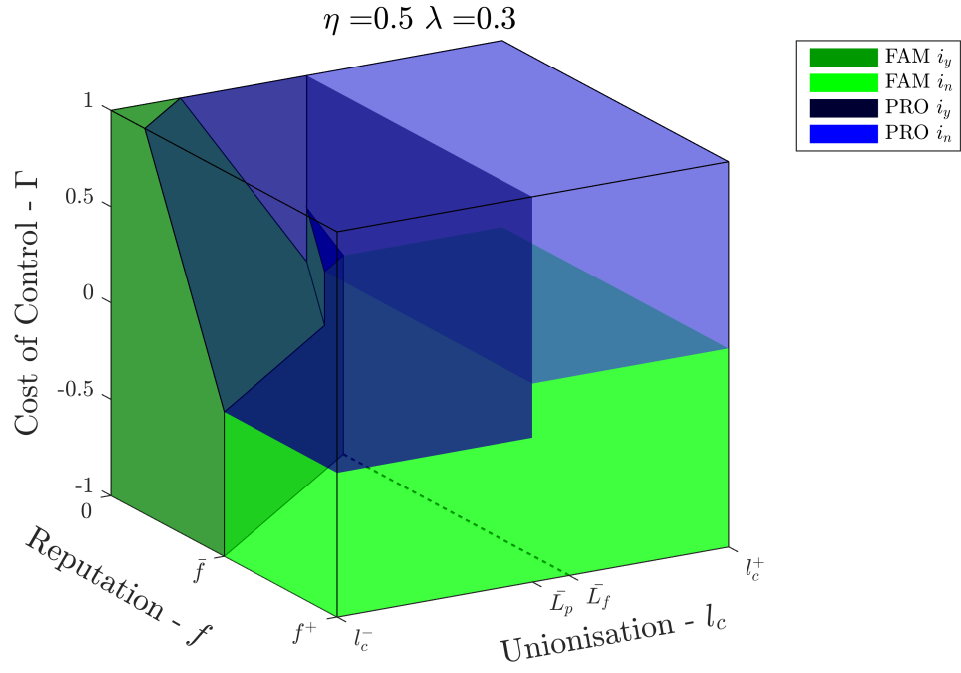
Note: Data from the Ownership Survey. Graph shows the share of firms that had a succession of control to Family CEO and those that had a succession to “Professional” (non-family) CEO, by the number of sons the outgoing CEO. Sample includes only firms used in the IV analysis, and restricted to only outgoing CEOs who had at least one child. $N = 818$. Appendix Figure A2 shows the breakdown of family CEO by type of family member (sons, daughters, other family) and professional CEO by ownership (family owned or non-family owned). Total $N = 920$, $N(0 \text{ sons})=67$; $N(1 \text{ son})=294$; $N(2 \text{ sons})=324$; $N(3+\text{sons})=231$.

Figure 3: Distribution of family size (number of children) conditional on gender of the first child



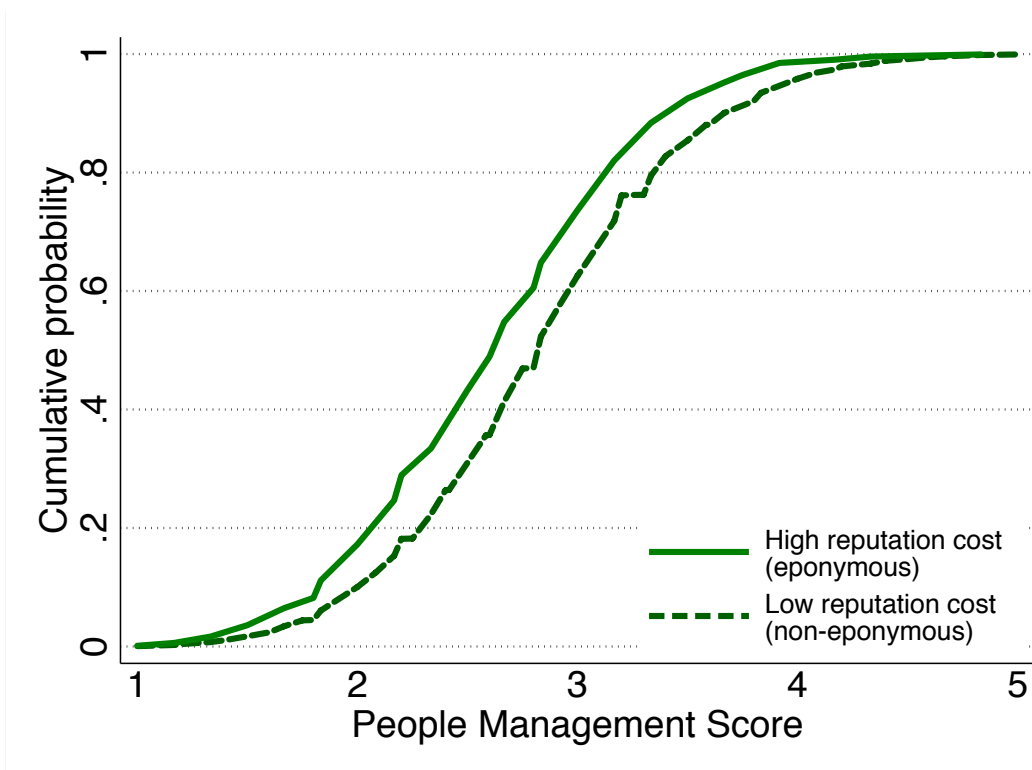
Note: Data from the Ownership Survey. Distribution of total the number of children of outgoing CEOs in the IV analysis. Solid bars show the distribution of total number of children for outgoing CEOs who had a female first child, and black outline bars show the distribution of total number of children for outgoing CEOs who had a male first child. The Kolmogorov-Smirnov test of equality of distributions fails to reject equality with a p-value of 0.784.

Figure 4: Parameters determining the four equilibria space, for $\eta = .5$



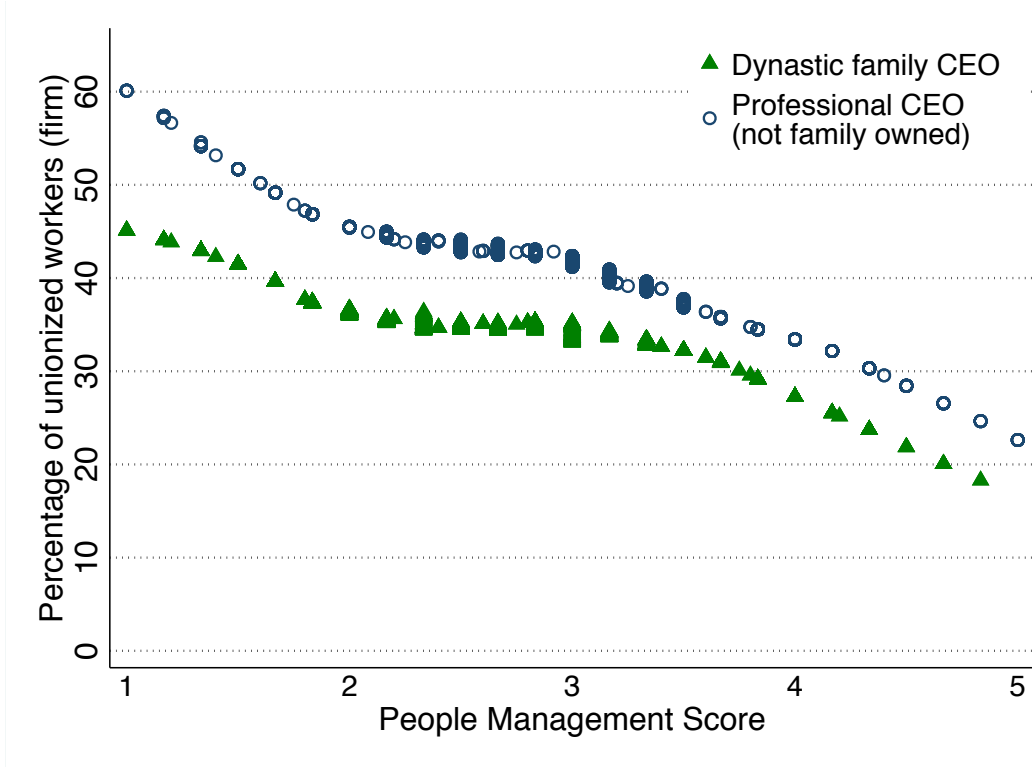
Note: Figure shows the share of firms that would be predicted to be family firms adopting monitoring (dark green), family firms not adopting monitoring (light green), non-family firms adopting monitoring (dark blue), non-family firms not adopting monitoring (light blue).

Figure 5: Prediction 1: firms with higher reputation costs (f) vs management



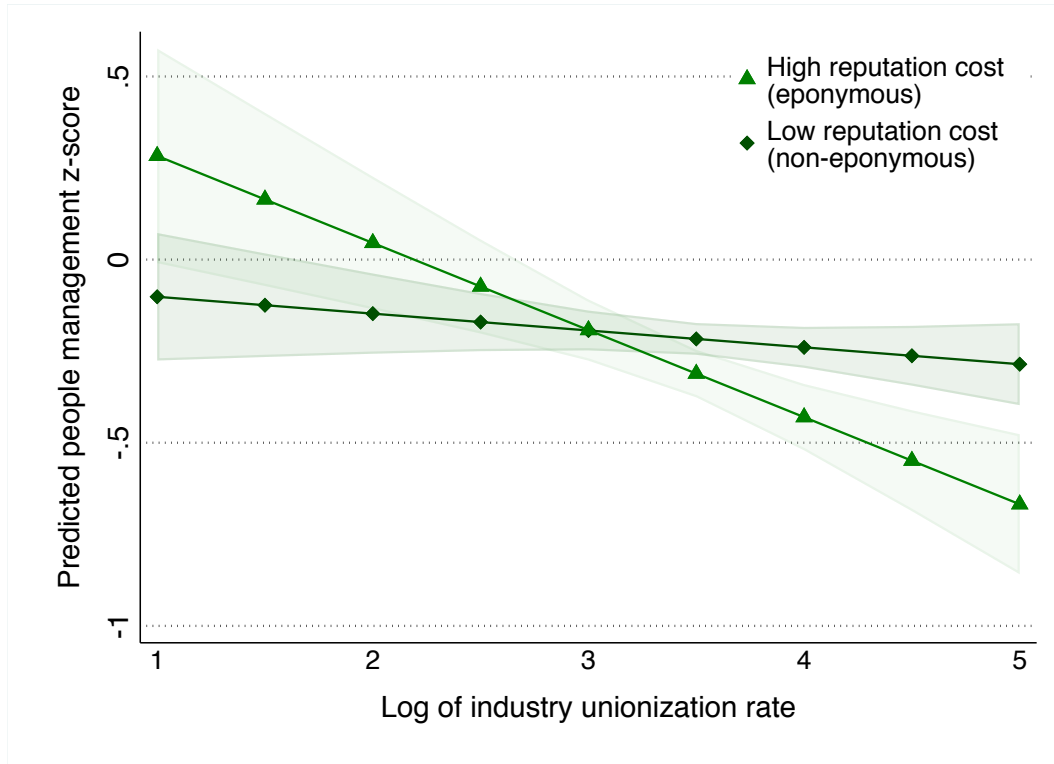
Note: Data from the World Management Survey. Family firms only. **Eponymous** is an indicator with a value of 1 if the firm has the family name. Kolmogorov-Smirnov test of equality of distributions rejects equality (p-value \leq 0.000).

Figure 6: Prediction 2: common firing costs ℓ_c and investment in management



Note: Data from the World Management Survey. Excludes founder-owned firms. Dynastic family CEO includes second generation family firms with family CEOs. Professional CEOs include non-family owned firms with professional CEOs. Local linear regressions run with bandwidth 0.5. Family firm N: 2,931. Non-family firm N: 8,016.

Figure 7: Corollary: investment in management and the interaction of common firing costs ℓ_c and reputation costs f



Note: Data from the World Management Survey and Orbis BvD. Second-generation family firms only. Graph shows the margins plot of the interaction between the **log of industry-level unionization rate** (as reported in the WMS) and eponymy status. **Eponymous** is an indicator with a value of 1 if the firm has the family name. Regression controls for log of employment at the firm, firm age and multinational status.

Appendices

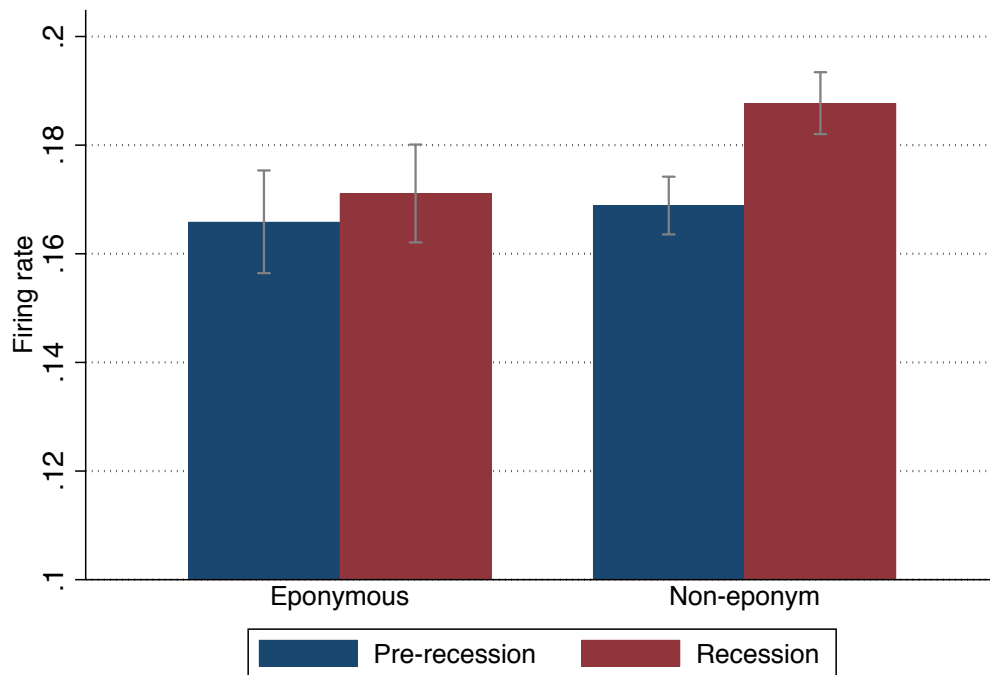
A Data Appendix

A.1 Additional figures

A.1.1 Validation of eponymy as a proxy for reputation cost

We propose to use whether a firm is named after the family (i.e. eponymy) as a measure of how costly it is for firms to enact policies that could be seen as detrimental to workers. We classify firms as eponymous using data from WMS and Orbis. A simple test of whether eponymous firms behave differently from non-eponymous firms is to look at their firing behaviour during crises. Using the 2009 recession as a shock, we compare the firing rates for eponymous and non-eponymous firms pre- and post-recession. Eponymous firms do not change their firing rates significantly, but non-eponymous family firms significantly increase their firing rates post-recession. While we are not looking to establish causality, the pattern corroborates the anecdotal evidence that eponymy is a reasonable proxy for reputation exposure.

Figure A1: Validating reputation proxy: eponymous firms fire fewer workers



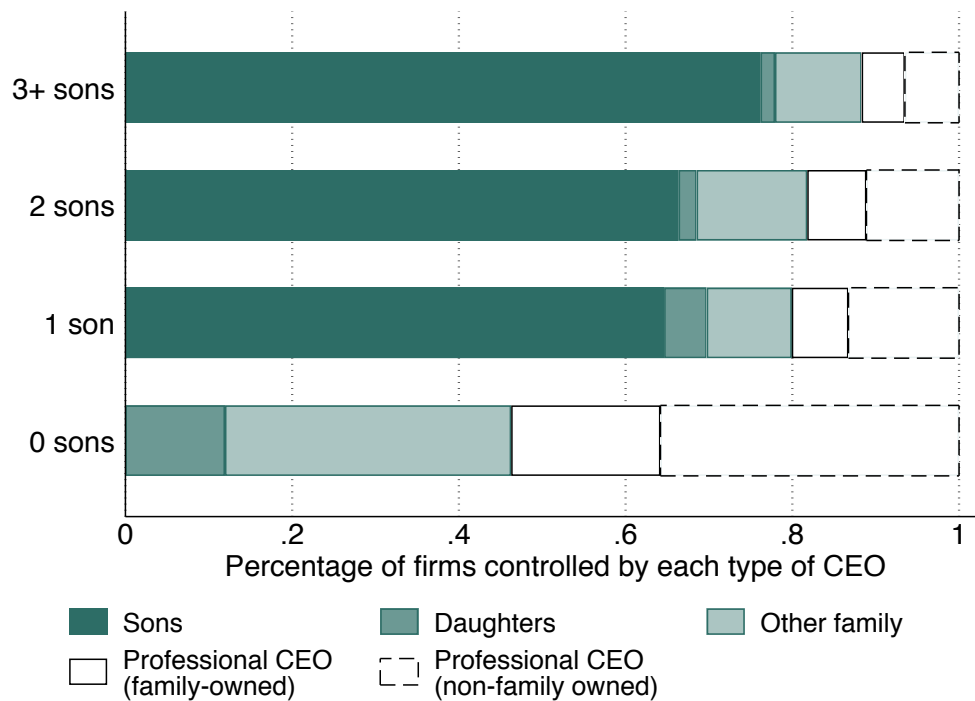
Note: Data from RAIS and Orbis, 2003-2013. Post-recession is defined as after 2008.

Note: Data from the World Management Survey, Orbis and RAIS. Eponymy indicates family firms named after the family name. Pre-recession defined as 2003-2008, post-recession defined as 2009-2013.

A.1.2 IV validity

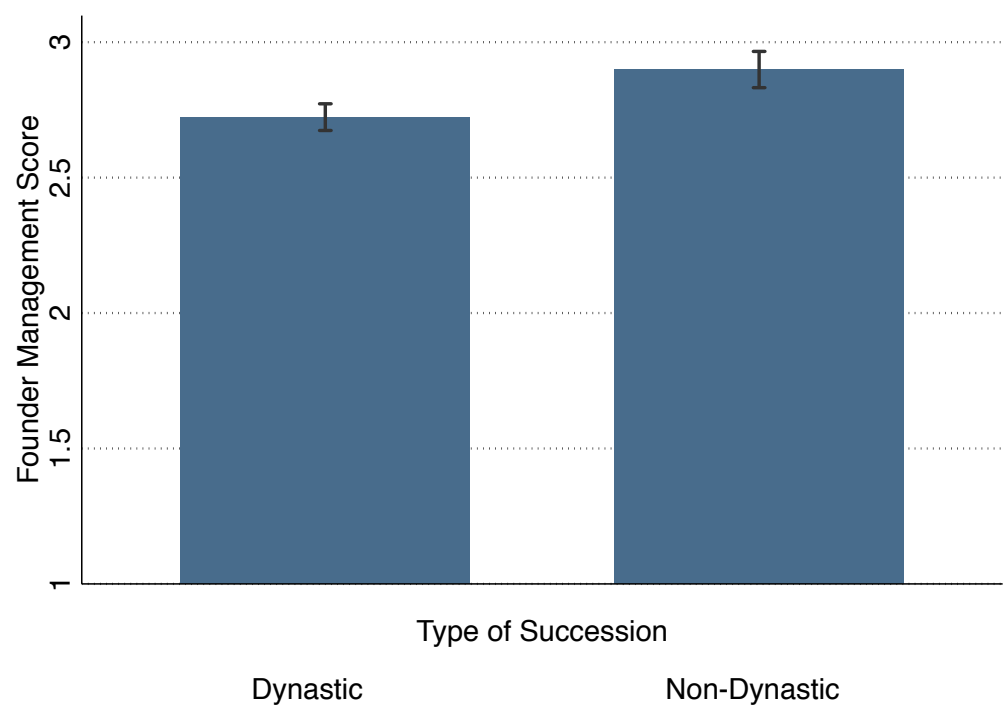
Additional figures to validate the use of the outgoing CEO's children as an instrument for dynastic succession.

Figure A2: Successions from founder or family control, by number of sons of the outgoing CEO



Note: Data from the Ownership Survey. Graph shows the share of firms that had a succession of control to a Family CEO (son, daughter, other family members) or a Professional CEO (with ownership still under the family, or the firm being fully sold). Total N = 920, N(0 sons)=67; N(1 son)=294; N(2 sons)=324; N(3+sons)=231.

Figure A3: Founder Adoption of management practices, by succession type



Note: Data from the World Management Survey. Only firms with management measured at two or more points in time: the first observation during the founder’s tenure, and the second observation after a succession took place. Dynastic successions refer to a founder passing the firm to a family member, and non-dynastic is every other type of succession (to a professional CEO, or selling the firm).

A.2 Sample and summary statistics

Table A1: Sample of firms: country level

Country	WMS sample N	Ownership Survey sample N	Response Rate %	Potentially eligible (non-founder)	IV analysis sample N	Inclusion Rate* %
Latin America						
Argentina	249	164	66%	128	94	73.4%
Brazil**	814	554	68%	329	230	69.9%
Chile	239	103	43%	81	38	56.8%
Colombia	170	65	38%	46	31	67.4%
Mexico	281	142	51%	104	62	59.6%
Latin American total	1753	1028	59%	688	455	66.1%
Africa***						
Ethiopia	131	116	89%	84	-	-
Ghana	108	79	73%	55	-	-
Kenya	185	158	85%	103	21	20.4%
Mozambique	109	43	39%	72	-	-
Nigeria	118	118	100%	52	-	-
Tanzania	150	74	49%	99	-	-
Africa total	801	588	73%	465	21	20.4%
Europe						
France	206	141	68%	126	31	24.6%
Great Britain	390	296	76%	281	44	15.7%
Germany	136	77	57%	71	23	32.4%
Italy	320	318	99%	285	120	42.1%
Netherlands	143	124	87%	222	102	45.9%
Portugal	101	99	98%	74	37	50.0%
Turkey	332	163	49%	83	79	95.2%
Europe total	1628	1218	76%	1142	436	43.4%
Total	4182	2834	68%	1933	912	47.1%

Note: Notes: The pilot of the Ownership Survey was carried out immediately following the 2013 World Management Survey (WMS) wave, and a portion of the survey was also applied during the 2014 WMS European wave. First column shows the the total number of firms interviewed in the 2013/14, and the second column shows the number of firms for which we also collected data for the Ownership Survey.

* We use a more conservative definition of response rate here, referring to "full response rate". That is, there were some firms for which we had a positive response to part of the survey, but not all the information we needed to be able to include the firm in our IV sample. The rates shown here refer only to these "full information" firms, rather than all firms that responded to the survey at least in part.

** The inclusion rate for Brazil is higher than the number of firms in the 2013/14 sample because we also contacted firms in the 2008 wave of the World Management Survey for Brazil to expand the sample in Brazil in particular.

*** The sample for Africa in the Ownership Survey is included in the stylized facts section of the paper, but only Kenya is used in the IV analysis because the sample of firms that had *at least one succession* from the founder was too small to be included. Only Kenya passed the minimum threshold sample of 20 observations and thus is the only country included while the others are noted as zeroes. Although we have some data for these countries, we report here only the data points used in the analysis.

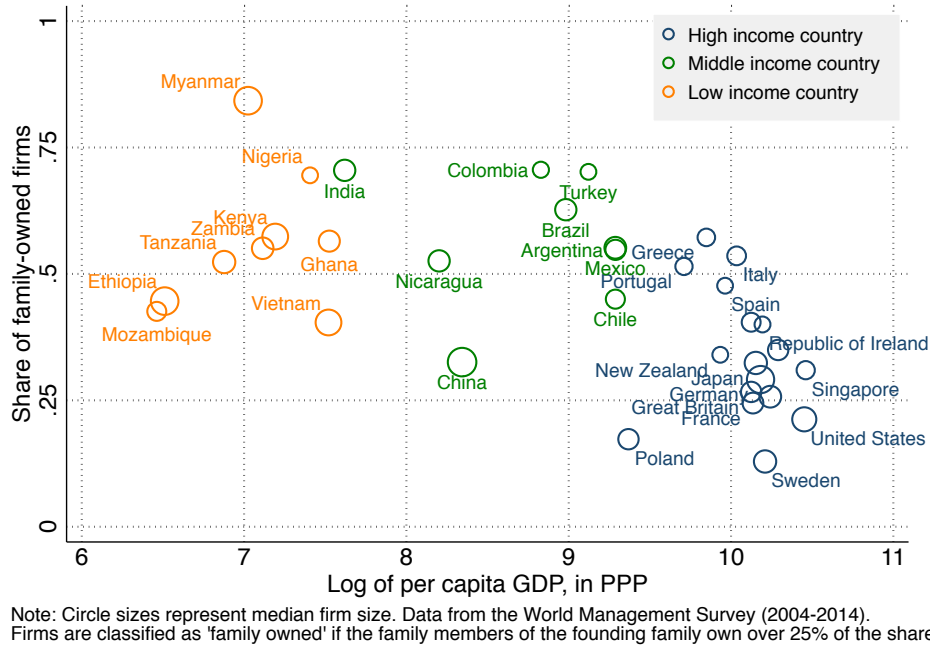
The Ownership Survey collects data on the full history of ownership and control from the time of foundation and dates of these changes. For firms that at the time of inception were family firms, data on the outgoing CEO's family is also collected. Our survey is specifically concerned with *controlling ownership*, and while we don't ask for specific share count information, we ascertain that the majority owners hold more than 25% of the controlling shares (that is, "voting shares" or equivalent terminology). We exclude government firms from our analysis. The interviewees for the Ownership Survey are one of the following: firm CEO or executive assistant to the CEO, head of administration, or if the firm was recently sold, the longest tenured employee at the managerial level. For the WMS, the interviewees are usually the plant manager. In 2011 the WMS team

conducted a follow-up project that looked to cross-check the survey information with external data sources, such as Bureau van Dijk’s data, online research through company documents and websites and call-backs. The ownership structure data from the survey was correct over 75% of the time, and was amended otherwise.

A.3 Management and productivity in dynastic firms: descriptive evidence

Family firms are the most common type of firm in the world, particularly in developing countries (Figure A4). It is well established that structured management is correlated with productivity for average firms, but less attention has been paid to this relationship within family firms. Bloom et al. (2013) offers the best experimental evidence to date, where the treated firms received management consulting and showed a causal improvement of 17% higher productivity within the first year. All the firms in this experiment were family firms in Mumbai, India.³⁷ To supplement these experimental findings from India, we present evidence on the correlational relationship between ownership and firm performance for a cross-sectional sample of over 6000 primarily European firms as well as a panel sample of over 500 Brazilian firms.

Figure A4: Share of family or founder firms across the world, manufacturing



Note: Circle sizes represent median firm size. Data from the World Management Survey (2004-2014). Firms are classified as “family owned” if the family members of the founding family own over 25% of voting shares.

Table A2 reports the conditional correlation of dynastic firms, management and log of sales per employee. Column (1) shows the baseline relationship between firm performance and dynastic family control. The coefficient of -0.365 suggests that having a dynastic CEO is correlated with 37% lower sales, relative to a non-family private firm (reference category). Column (2) includes a series

³⁷For a look at the long-term impacts, see Bloom et al. (2018)

of firm controls, including measures of log of capital, log of labor, log of firm age, an indicator for multinational status, as well as country and industry fixed effects. The gap reduces substantially to -0.08, though remains significant. Column (3) includes our standardized measure of management practices, which absorbs a substantial portion of the variation captured by the dynastic family CEO indicator. The coefficient on the management measure suggests a one standard deviation increase in management practices is associated with approximately 6% higher firm sales. We explore whether structured management practices matter more (or less) for family firms. We include an interaction term between management and the dynastic family CEO indicator in column (4). The result shows a small and insignificant relationship. In columns (5) and (6) we break the sample into family and non-family firms and show that the conditional correlation between our measure of management and log of sales is similar across the two sub-samples.

Table A2: Management and firm performance: descriptive evidence using accounts data (Orbis)

	Dependent variable: $\ln(\text{sales})$					
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership categories						
<i>Private firms (ref. category)</i>						
Dynastic family CEO	-0.365*** (0.060)	-0.080** (0.033)	-0.038 (0.034)	-0.036 (0.034)		
Management variables						
z-management			0.057*** (0.014)	0.063*** (0.017)	0.087*** (0.031)	0.052*** (0.017)
z-management × Dynastic CEO				-0.005 (0.029)		
Firm controls		✓	✓	✓	✓	✓
Industry FE		✓	✓	✓	✓	✓
Survey noise controls			✓	✓	✓	✓
# Observations	6125	6125	6125	6125	895	4465
R^2	0.275	0.776	0.780	0.780	0.799	0.782
Sample:	All	All	All	All	Family	Non-family
	WMS	WMS	WMS	WMS	WMS	WMS

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Note: Regressions estimated by OLS. Standard errors clustered by firm. Sales, employment and tangible assets (capital) data from Orbis Bureau van Dyck (public accounts data). Includes only data from the WMS that could be matched to sales data from BvD. Management data from the World Management Survey. z-management is the plant-level standardized average management score (18 practices). Firm controls include country dummies, log of employment, log of capital, log of firm age, and whether the firm is a multinational. Industry fixed effects are at the 3-digit SIC level. Survey noise controls include analyst dummies, year of survey, day of week, and manager tenure.

Given the limitations of OLS in estimating production functions, we run a [Levinsohn and Petrin \(2003\)](#) specification on the available Brazilian firms, as the only middle income economy with a detailed industrial census that we could match with the WMS. There is a vast literature on estimating production functions and a number of papers that use the Brazilian industrial census.³⁸

³⁸For a summary, see Marc-Andreas Muendler's website at <http://econweb.ucsd.edu/muendler/html/brazil.html>

In contrast, our focus here is on the coefficient on the management variable and we use two methods to estimate the correlation between management and productivity. Table A3 reports the descriptive results of this additional exercise. For the Brazilian WMS sample, a standard deviation is 0.647 points. The OLS models in columns (1) through (4) in the top panel use only the cross-section of data that is contemporaneous to the 2008 WMS Brazilian survey. The results suggest that the correlation between management and value added is strong and substantial for the Brazilian firms in our sample. Column (1) suggests that one standard deviation higher management quality is associated with 12% higher value added for family firms, and 18% higher value added for non-family firms. The results are slightly lower in terms of sales, suggesting a bump of 5% higher sales for family firms and 9% for non-family firms. The bottom panel repeats the exercise but take advantage of the panel structure of the Brazilian industrial census and include data from 1999 to 2014 to run a [Levinsohn and Petrin \(2003\)](#) model. The relationship between management and productivity in both family and non-family firms remains robust to using a different model specification.

Table A3: Management and firm performance: descriptive evidence from Brazilian Census data

Dependent variable:	ln(value added)		ln(sales)	
	(1)	(2)	(3)	(4)
Model: OLS				
z-management	0.115*** (0.029)	0.179*** (0.031)	0.050*** (0.011)	0.090*** (0.018)
# Observations	213	290	213	291
# Firms	213	290	213	291
Model: Levinsohn-Petrin				
z-management	0.129*** (0.038)	0.194*** (0.038)	0.057*** (0.01)	0.080*** (0.013)
# Observations	3000	3595	3269	3963
# Firms	213	290	213	291
Firm controls	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓
Sample	Family	Non-family	Family	Non-family

Each column of regressions is estimated by either OLS or by the [Levinsohn and Petrin \(2003\)](#) method as identified in the table. OLS models cluster standard errors by firm. Firm value added, capital measures and industry codes come from the Brazilian Industrial Survey (PIA). Data from 1999 to 2014. z-management is the plant-level standardized average management score (18 practices). Firm controls include country dummies, log of employment, log of capital, log of firm age, and whether the firm is a multinational. Industry fixed effects are at the 3-digit SIC level. Survey noise controls include analyst dummies, year of survey, day of week, and manager tenure.

A.4 Robustness checks

Our results remain robust to different sets of instruments and specifications. Table A4 reports the results for our specifications from Table 3 using two different sets of sampling weights in Columns (1) to (3) and (4) to (6), and the results for two different functional forms of the number of sons IV, in Columns (7) and (8). The sampling weights in the first set of columns were calculated within each country, while the second set were calculated for the full sample including country fixed effects. The results are qualitatively similar to those in the main results table. The two different functional forms of the IV that we are exploring as a robustness check are:

$$\begin{aligned}
FamilyCEO_i &= \alpha_{fs} + \sum_{j=2}^3 \rho_j SON_j + \vartheta_1 SON_1 + \vartheta_2 children_i + \boldsymbol{\eta}' \mathbf{X}_i + \nu_i \\
FamilyCEO_i &= \alpha_{fs} + \sum_{j=1}^3 \rho_j SON_j + \sum_{j=1}^3 \vartheta_j children_j + \boldsymbol{\eta}' \mathbf{X}_i + \nu_i
\end{aligned} \tag{5}$$

In Column (7), we further address the concern that number of sons is endogenous because families have multiple children until they “finally get a son.” Here we input the dummy variable for “exactly one son” as a *control* rather than an IV. The rationale for this is to test whether the result was being driven by a family having *the first boy* - that is, we control for the “first boy effect,” by including it to the set of controls. The second stage results are not statistically different, suggesting the effect is not wholly driven by having exactly one boy. Column (8) shows the number of sons IV controlling for family size (number of children) also as a step function. We lose efficiency by including an extra set of dummy variables, but the coefficients are not statistically different from the other two iterations of this IV.

Table A4: IV-2SLS results, robustness checks

	Sampling weights: by country			Sampling weights: overall			IV functional forms unweighted	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family CEO = 1	-1.360** (0.591)	-1.151** (0.553)	-0.425 (0.420)	-1.202** (0.555)	-0.997* (0.522)	-0.501 (0.435)	-0.584 (0.474)	-0.824* (0.425)
# Firms	912	908	902	912	908	902	805	908
K-P Wald F-statistic	15.49	5.436	22.48	16.40	5.789	21.40	4.839	12.41
Hansen's J statistic		4.054			3.843		1.201	0.291
Hansen's J p-value		0.132			0.146		0.548	0.589
IV First Stage results								
<i>Excluded instruments</i>								
Had at least 1 son	0.269*** (0.068)			0.271*** (0.067)				
First child = male			0.170*** (0.036)			0.163*** (0.035)		
1 son		0.253*** (0.071)			0.254*** (0.069)		0.285*** (0.080)	0.285*** (0.063)
2 sons		0.283*** (0.072)			0.286*** (0.070)		0.297*** (0.083)	0.305*** (0.064)
3+ sons		0.295*** (0.076)			0.297*** (0.075)		0.332*** (0.088)	0.338*** (0.069)
1 child							0.079 (0.118)	
2 children							0.074 (0.113)	
3+ children							0.132 (0.116)	
Control for family size: linear	✓	✓		✓	✓			
# Firms	912	908	902	912	908	902	805	908
# Observations	920	916	909	920	916	909	813	916

Note: All columns are estimated by IV-2SLS using Stata's `ivreg2` command. Management data comes from the World Management Survey. z-management is the plant-level standardized management score. Ownership and family history data comes from the Ownership Survey. General controls include firm-level controls for average hours worked, whether the firm is listed on the stock market, plus a set of country dummies. Noise controls include a set of interviewer dummies, the seniority and tenure of the manager who responded, the day of the week the interview was conducted, the time of day the interview was conducted and the duration of the interview. Columns (1) through (3) use sampling weights based on firm size by country, and Columns (4) through (6) use sampling weights based on firm size overall (across all countries). Columns (7) and (8) are unweighted.

B Conceptual Framework: formalization

B.1 Set up

Workers The payoff of a worker is a function of effort $e_w \in [\underline{e}_w, \overline{e}_w]$, wages, W , and the disciplining decision of the CEO, $d \in [D_n, D_y]$, detailed below. Let the utility function for the worker be:

$$u_w = \begin{cases} W - c_e(e_w) & \text{if } d = D_n \\ W - c_e(e_w) - c_d & \text{if } d = D_y \end{cases} \quad (6)$$

where $c_e(e_w)$ is the cost of effort as a function of exerted effort, and c_d is the fixed utility cost of being disciplined.

CEOs Let the cost of disciplining workers that is common to all CEOs be exogenously set at ℓ . CEOs decide whether to invest in the monitoring technology $i \in [i_n, i_y]$, at a fixed cost m . The cost of adopting the monitoring technology m is personally incurred by CEO (both professional and family) as she is the executive in charge of pushing changes through. Let firm profits be a function of worker effort: $\pi(e_w)$.

Professional CEO: Professional CEOs are paid a share of profits, $\lambda\pi(e_w)$, as their compensation.³⁹ The utility function of a professional CEO is as follows:

$$u_{pro} = \begin{cases} \lambda\pi(e_w) - [m \mid i = i_y] & \text{if } d = D_n \\ \lambda\pi(e_w) - [m \mid i = i_y] - \ell & \text{if } d = D_y \end{cases} \quad (7)$$

Family CEO: Family CEOs incur a cost of effort of running the firm $R \in [0, 1]$ but also accrue a private utility benefit from controlling their family firm, $B \in [0, 1]$. Let Γ be the net utility cost of control: $\Gamma = R - B$. $\Gamma \in [-1, 1]$.⁴⁰

Because of implicit long-term employment commitments to employees, the family CEO incurs an additional cost of disciplining workers, $c_f(f)$ that is a function of the firm's reputation exposure f . For example, if the firm is a major employer in the region and would face a large backlash for reneging on implicit commitments to employees, such as cutting benefits or imposing mass layoffs. The total cost of disciplining workers for family CEOs is then $\ell + c_f(f)$. The utility function of a family CEO is as follows:

$$u_{fam} = \begin{cases} \pi(e_w) - [m \mid i = i_y] - \Gamma & \text{if } d = D_n \\ \pi(e_w) - [m \mid i = i_y] - \Gamma - \ell - c_f(f) & \text{if } d = D_y \end{cases} \quad (8)$$

In short, the two types of CEOs face the same payoff structure, but family CEOs have a value of $\lambda = 1$, and professional CEOs have $f = 0$ (implying $c_f(0) = 0$ and $\Gamma = 0$).

³⁹As contract design is not the focus of the model, we will take λ as given.

⁴⁰The professional CEO's cost of effort in running the firm is embedded in the contract, and thus not made explicit.

Owner The utility of the owner is equal to the family CEO's if the firm is family managed or the share of leftover profits if the owner chooses a professional $Mg = PRO$.⁴¹

$$u_{own} = \begin{cases} u_{fam} & \text{if } Mg = FAM \\ (1 - \lambda)\pi(e_w) & \text{if } Mg = PRO \end{cases} \quad (9)$$

B.2 Equilibrium: preliminary analysis

We can rule out some actions as never optimal, and replace them with their sub-game perfect equilibrium outcomes. The actions are as follows:

1. The CEO will never discipline a worker who she observes exerting effort, since disciplining workers is a costly action. Thus, D_n is chosen when:
 - the CEO chooses not to invest monitoring and thus cannot observe effort ($i = i_n$)
 - or
 - the CEO chooses to invest monitoring ($i = i_y$) and the worker exerts effort ($e_w = \bar{e}_w$).
2. The worker will not exert effort unless the cost of effort is lower than the cost of being disciplined. Workers choose low effort ($e_w = \underline{e}_w$) when:
 - the CEO chooses not to invest monitoring and thus cannot observe effort ($i = i_n$),
 - or
 - the worker is of low ability.

Therefore, eighteen out of thirty two possible outcomes can be replaced by their sub-game perfect equilibria. Imposing these results yields the game tree in Figure A8.

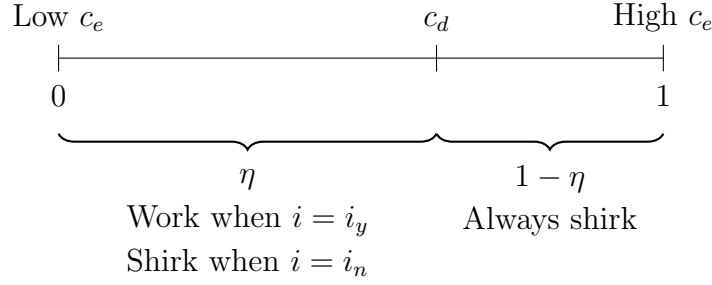
We can make further simplifications. The key choice that we seek to understand with this framework is the investment choice of each CEO. The first choice of the game determining whether the owner will be a family CEO or choose to hire a professional CEO is a choice that has been explored in the literature before, and here is simply a function of the size of the private benefit of control. As both CEO types face the same set of choices with slightly different payoff functions, the focus the backward induction exercise is on determining the subgame equilibria for each CEO type and discuss the owner's choice last.

B.2.1 Equilibrium: comments on modelling choices

Worker's effort choice Let workers have a cost of effort $c_e \sim U(0, 1)$. There is a share of workers, η , for which the cost of effort is below the fixed cost of being disciplined c_d , such that $c_e \leq c_d$. These workers will choose to exert effort if they have a chance of being disciplined, and will choose not to exert effort if they have no chance of being disciplined. There is a share of workers $1 - \eta$ for which the cost of effort is above the cost of being disciplined, such that $c_e > c_d$. These workers will never exert effort, regardless of the chance of disciplined. A way to interpret

⁴¹The implicit simplification here is that this is the extreme case where the family CEO yields the entire profit to the "family pot". We choose this simplification because the focus of the framework is not on the owner's choice of family or professional CEO but rather the choices of the CEOs. The owner would still opt for family management for a share of profit as long as the total share of profit is larger than what they would earn from a professional CEO.

this setup is to think of employees as being of high or low ability and a share of them who have high ability (η) can choose to work as it is not too costly, whereas a share $1 - \eta$ has low ability and always find it too onerous to work.



Professional CEO compensation $\lambda\pi(e_w)$ is the executive’s compensation. The CEO is assumed to not have enough capital to purchase the firm outright and thus has to be employed. λ is assumed to be exogenous and represents the CEO net wages, taking into account the manager’s cost of effort of running the firm. The λ here could also include any profit appropriation that may happen because of low legal oversight, as in [Burkart and Panunzi \(2006\)](#). This payoff is assumed to be larger than their outside option, such that there is at least one professional CEO who always agrees to manage the firm if the contract is offered.

CEO costs of control Γ is the net cost of control. It is representing the cost of effort that a CEO has to expend to run a firm, net of any private benefit of control he may accrue from doing so. Intuitively, the variable setup suggests that if the private benefit of control is relatively low, the family CEO would compare the cost of effort to the financial cost of hiring a professional CEO. If the family CEO gains a very high level of private benefit from control relative to how onerous it is for him to manage the firm, the utility cost would be “negative”.

$\Gamma = 0$ for professional CEO is a simplification to make the model tractable. Conceptually, the professional CEO would also incur a cost of effort for their work, but this cost would be included into the $\lambda\pi(e_w)$ payoff bundle. We are implicitly assuming that this cost is equal for professional CEOs and family CEOs — that is, in a sense we are assuming the same level of ability for both CEO types. This is a departure from the usual assumption in previous models, but one that can be relaxed at a later time.⁴²

CEO firing costs All CEOs incur a common cost of firing workers, $\ell \in \{\ell^-, \ell^+\}$, where ℓ^- denotes the lowest cost possible across all industries and ℓ^+ denotes the highest. In the game, this cost is exogenously set in each industry. Conceptually, we can interpret this cost as, say, an industry with higher rates of unionization than the average having an ℓ closer to ℓ^+ , or a country with lax labour laws relative to the average country having ℓ closer to ℓ^- .⁴³ The industry for each firm and worker is determined before the game.

Family CEOs incur an additional firm reputation utility cost, $c_f(f)$ if they have to discipline workers (regardless of effort). This is a function of their reputation exposure, f and reflects how emotionally important the firm’s standing in the community is for the family CEO, and is consistent with the idea that family firms are held to a higher “moral standard” than faceless

⁴²For example, [Burkart and Panunzi \(2006\)](#) assume professional CEOs have higher ability.

⁴³In a dynamic model, there would be a cost of recruitment for the next period.

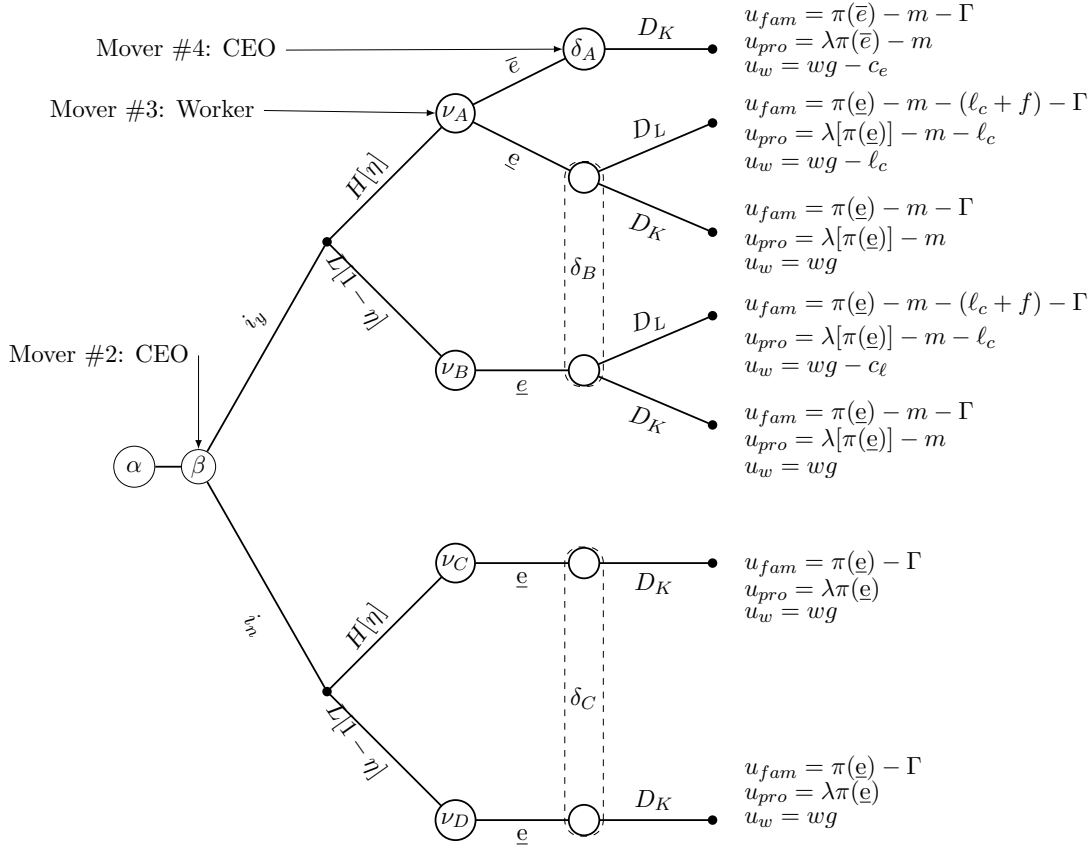
corporations: for example, if a family firm CEO fires workers they can suffer a backlash from the wider community the firm is located in. For professional CEOs, it is always the case that $f = 0$.

For each CEO, there will be a threshold \bar{L} at which the cost of disciplining workers is too high to be worth investing in monitoring. Because the cost is increasing in both ℓ and c_f , this implies that the total cost of firing workers will always be higher for the family CEO, except in the case where $f = 0$ for the family CEO.

B.3 Backward induction

Figure A5 shows the game tree outlining the possible decisions of the CEO, already including the results from the preliminary analysis in place of the full set of choices wherever possible. The utility functions shown as the payoffs next to each terminal node specify the utility functions for the family and professional CEOs and for the worker. Note that it only specifies the owner's payoffs as a family CEO, as we address the owner's choice last accounting for the payoffs under a professional CEO as well. β , ν and δ inside the nodes or dashed lines label the information sets.

Figure A5: Game tree: CEO's investment decision



Fourth mover (last) — CEO: The last actor to make a decision is the CEO. He chooses whether he will fire the worker ($d = D_y$) or keep the worker ($d = D_n$). This is the CEO's second action choice; the CEO's first action choice is the investment choice ($i \in \{i_y, i_n\}$).

CEO Strategy: The CEO has only one rational choice at the information sets δ_B and δ_C : D_n (to keep the worker). The action chosen at δ_A depends on the world and firm reputation costs of firing workers, $\ell + c_f$. Recall there is a threshold at which firing costs become too high — say, \bar{L} , and for each industry, there is a share η of workers who will work and a share $(1 - \eta)$ who will shirk and could be fired.

Thus, the CEOs strategies at $\{\delta_A, \delta_B, \delta_C\}$ are:

1. $H_C = \{D_n, D_y, D_n\}$ if $\ell + c_f > \bar{L}$
2. $H_C = \{D_n, D_y, D_n\}$ if $\ell + c_f \leq \bar{L}$

In his disciplining choice, he will choose to fire a worker under the following conditions:

- (a) the worker shirks ($e_w = \underline{e}_w$)
and
- (b) the CEO invested in monitoring ($i = i_y$)
and
- (c) the costs of firing workers is below the threshold: $(\ell + c_f) \leq \bar{L}$.

If any of these three conditions is violated, the CEO will keep the worker ($d = D_n$). We discuss the firing choice in context of the investment decision after describing the investment decision for the second mover.

Third mover — worker: Moving backwards, the second-last actor to make a decision is the worker. Workers naturally prefer to exert low effort and not be fired. However, they make their effort decision conditional on what they expect the response of the CEO will be, and on their own type.

Worker strategy: The worker has only one rational choice at the information sets ν_B , ν_C and ν_D : $e_w = \underline{e}_w$, since effort will not be observed at these nodes. The action chosen at ν_A depends on worker type. For each worker, if they are of low ability type ($c_e > c_d$), the action at all nodes will be \underline{e}_w . If they are of high ability type ($c_e \leq c_d$), the action at information set ν_A will be \bar{e} . In summary, the worker has two strategies:

1. $H_{W,L} = \{\underline{e}_w, \underline{e}_w, \underline{e}_w, \underline{e}_w\}$ if $c_e > c_d$ (low ability type)
2. $H_{W,H} = \{\bar{e}_w, \underline{e}_w, \underline{e}_w, \underline{e}_w\}$ if $c_e \leq c_d$ (high ability type)

For a given industry with share η of workers of high ability type, we expect that η share of workers will choose the second strategy and $(1 - \eta)$ will choose the first strategy.

In summary, workers will exert effort ($e_w = \bar{e}_w$) under the following conditions:

- (a) the worker is of high ability type ($c_e \leq c_d$)
and
- (b) the CEO invests in monitoring ($i = i_y$).

Second mover — CEO: The CEO knows how workers make their choices, and also knows η and ℓ in her industry. This is the CEO's first action choice, before the second action choice of disciplining $d \in \{D_n, D_y\}$. The CEO will choose to invest in monitoring iff the additional expected profits (and utility) are larger than the expected costs incurred. Formally, the expected utility for each CEO type under $i = i_y$ is:

$$\begin{array}{ll} \text{Family CEO:} & \eta[\pi(\overline{e_w})] + (1 - \eta)[\pi(\underline{e_w}) - (\ell + c_f)] - m - \Gamma \\ \text{Professional CEO:} & \eta[\lambda\pi(\overline{e_w})] + (1 - \eta)[\lambda\pi(\underline{e_w}) - \ell] - m \end{array}$$

The equivalent expected utility under $i = i_n$ is:

$$\begin{array}{ll} \text{Family CEO:} & \pi(\underline{e_w}) - \Gamma \\ \text{Professional CEO:} & \lambda\pi(\underline{e_w}) \end{array}$$

CEO strategy: Let $\Delta\pi = \pi(\overline{e_w}) - \pi(\underline{e_w})$. At information set β each type of CEO will choose $i = i_y$ and invest in the monitoring technology iff the following conditions hold:

$$\begin{array}{ll} \text{Family CEO:} & \eta\Delta\pi \geq (1 - \eta)(\ell + c_f) + m \\ \text{Professional CEO:} & \lambda\eta\Delta\pi \geq (1 - \eta)(\ell) + m \end{array}$$

For each representative CEO type, let \overline{L} generally be the threshold at which it becomes optimal for any CEO to invest in monitoring. Let the threshold be \overline{L}_f for the family CEO and let the threshold be \overline{L}_p for the professional CEO. Rearranging the terms in the conditions above yields the following thresholds:

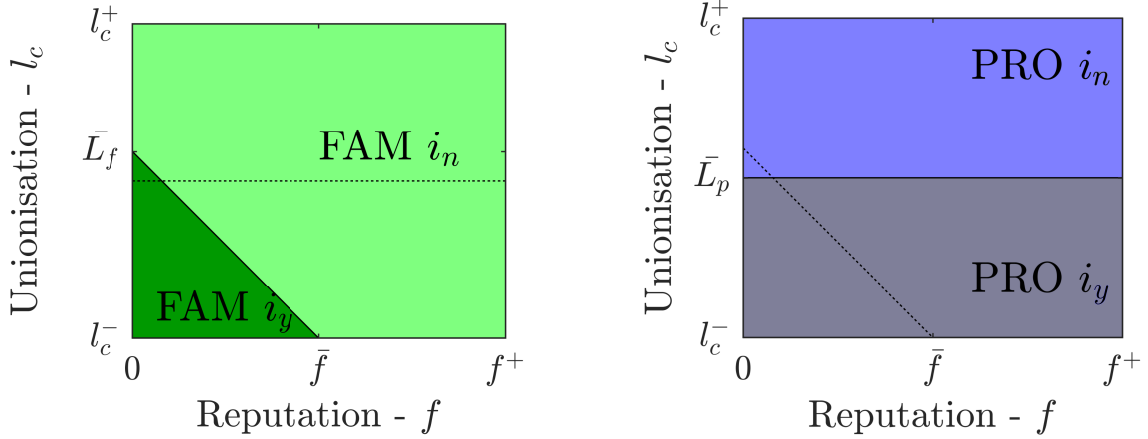
$$\begin{array}{ll} \text{Family CEO:} & \overline{L}_f \leq \frac{\eta\Delta\pi - m}{(1 - \eta)} \\ \text{Professional CEO:} & \overline{L}_p \leq \frac{\lambda\eta\Delta\pi - m}{(1 - \eta)} \end{array}$$

Conceptually, these conditions suggest that the professional CEO will only invest if the cost of firing is less than or equal to the added profit they can expect the firm to make minus the cost of investment, multiplied by the inverse of the share of low ability workers. Notably, this threshold is relatively lower for the professional CEO as they only get a share of the profits: the first term on the numerator of the condition is $\lambda\eta\Delta\pi$ for the professional CEO and $\eta\Delta\pi$ for the family CEO. Thus, $\overline{L}_f > \overline{L}_p$.

Figure A6 shows the two-dimensional space of ℓ and c_f for each CEO type. The darker colours indicate investment in monitoring and the lighter colours indicate no investment and are divided along the L thresholds for each type. Each graph also includes a dotted line with the threshold of the other CEO type for ease of comparison.

The CEOs full strategies at $\{\beta, \delta_A, \delta_B, \delta_C\}$ are:

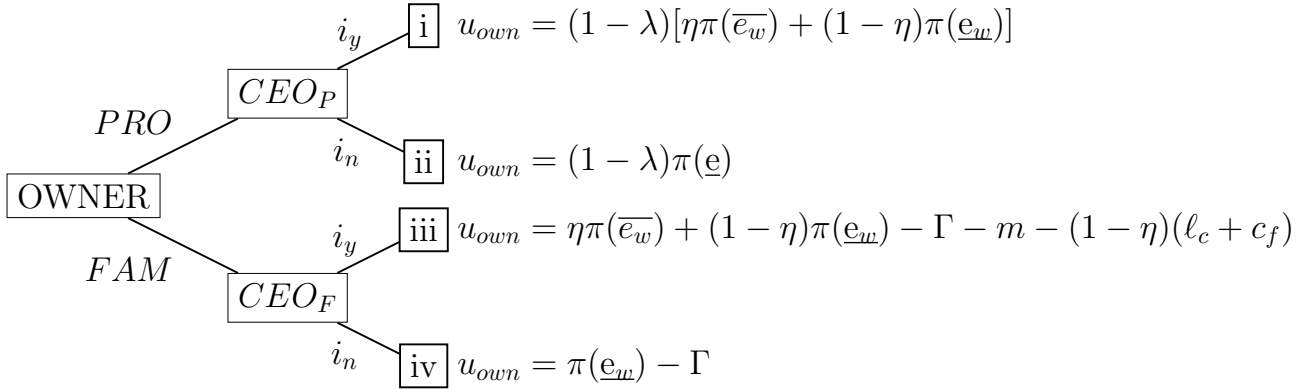
Figure A6: CEO investment decision: parameter space



1. $H_C = \{i_n, D_n, D_n, D_n\}$ if $\ell + c_f > \bar{L}_f$ (family) or if $\ell > \bar{L}_p$ (professional)
2. $H_C = \{i_y, D_n, D_y, D_n\}$ if $\ell + c_f \leq \bar{L}_f$ (family) or if $\ell \leq \bar{L}_p$ (professional)

First mover – owner: Finally, the owner's choice depends on the utility he would get if he acted as family CEO, versus the utility he would get from receiving the profits achieved by the professional CEO. Figure A7 shows the owner's payoffs at each terminal node if we substitute the game for the subgame perfect equilibrium at that node.

Figure A7: Game tree: owner's decision



The owner's decision depends on whether he would choose investment or not given a set of parameters, as well as his opportunity cost, which depends on whether the professional CEO would have invested or not. There are four possible set of parameters that determine the space for four equilibria:

Case 1: Both CEOs choose to invest in monitoring. Both CEOs would choose to invest, $i = i_y$, if $\ell \leq \bar{L}_p$ and $\ell + c_f \leq \bar{L}_f$. The owner's choice is based on the following utilities:

- $u_{own}(PRO, i_y) = (1 - \lambda)[\eta\pi(\bar{e}_w) + (1 - \eta)\pi(\underline{e}_w)]$
- $u_{own}(FAM, i_y) = \eta\pi(\bar{e}_w) + (1 - \eta)\pi(\underline{e}_w) - \Gamma - m - (1 - \eta)(\ell_c + f)$

The owner will choose $Mg = PRO$ when both CEOs opt for $i = i_y$ iff his utility from doing so is higher than his utility from running the firm himself,⁴⁴ otherwise, he will choose $Mg = FAM$:

$$(1 - \lambda)[\eta\pi(\bar{e}_w) + (1 - \eta)\pi(\underline{e}_w)] > \eta\pi(\bar{e}_w) + (1 - \eta)\pi(\underline{e}_w) - \Gamma - m - (1 - \eta)(\ell_c + f)$$

The conditions specifying where each equilibrium lies are as follows:

$$Mg = PRO, i = i_y \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1 - \eta} > \bar{\Gamma} + \bar{L}_p$$

$$Mg = FAM, i = i_y \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1 - \eta} \leq \bar{\Gamma} + \bar{L}_p$$

Case 2: Both CEOs choose not to invest in monitoring. Both CEOs would choose not to invest, $i = i_n$, if $\ell_c > \bar{L}_p$ and $\ell_c + f > \bar{L}_f$. The owner's choice is based on the following utilities:

- $u_{own}(PRO, i_n) = (1 - \lambda)\pi(\underline{e}_w)$
- $u_{own}(FAM, i_n) = \pi(\underline{e}_w) - \Gamma$

The owner will choose the CEO following the same logic, and the conditions for the key parameters are as follows:

$$Mg = PRO, i = i_n \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1 - \eta} > \bar{\Gamma} + \bar{L}_p$$

$$Mg = FAM, i = i_n \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1 - \eta} \leq \bar{\Gamma} + \bar{L}_p$$

Case 3: Only professional CEO chooses to invest. The professional CEO would choose to invest, $i = i_y$, while the family CEO would not, $i = i_n$ if: $\ell_c \leq \bar{L}_p$ and $\ell_c + f > \bar{L}_f$. The owner's choice is then based on the following utilities:

- $u_{own}(PRO, i_y) = (1 - \lambda)[\eta\pi(\bar{e}_w) + (1 - \eta)\pi(\underline{e}_w)]$
- $u_{own}(FAM, i_n) = \pi(\underline{e}_w) - \Gamma$

The owner will choose the CEO following the same logic, and the conditions for the key parameters are as follows:

⁴⁴Rearranging the terms provides an intuitive interpretation: the wage he expects to pay the professional CEO is smaller than the costs he will face if he chooses to manage the firm himself: $\lambda[\eta\pi(\bar{e}) + (1 - \eta)\pi(\underline{e})] < \Gamma + m + (1 - \eta)(\ell_c + f)$

$$Mg = PRO, i = i_y \quad \text{if:} \quad \frac{\Gamma}{1-\eta} > \bar{\Gamma} + \bar{L}_p - \bar{L}_f$$

$$Mg = FAM, i = i_n \quad \text{if:} \quad \frac{\Gamma}{1-\eta} \leq \bar{\Gamma} + \bar{L}_p - \bar{L}_f$$

Case 4: Only family CEO chooses to invest. The family CEO would choose to invest, $i = i_y$, while the professional CEO would not, $i = i_n$ if: $\ell_c > \bar{L}_p$ and $\ell_c + f \leq \bar{L}_f$. The owner's choice is then based on the following utilities:

- $u_{own}(PRO, i_n) = (1 - \lambda)\pi(\underline{e}_w)$
- $u_{own}(FAM, i_y) = \eta\pi(\bar{e}) + (1 - \eta)\pi(\underline{e}_w) - \Gamma - m - (1 - \eta)(\ell_c + f)$

The owner will choose the CEO following the same logic, and the conditions for the key parameters are as follows:

$$Mg = PRO, i = i_n \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1-\eta} > \bar{\Gamma} + \bar{L}_f$$

$$Mg = FAM, i = i_y \quad \text{if:} \quad \ell_c + f + \frac{\Gamma}{1-\eta} \leq \bar{\Gamma} + \bar{L}_f$$

Figure A8: Game tree: summary decision set

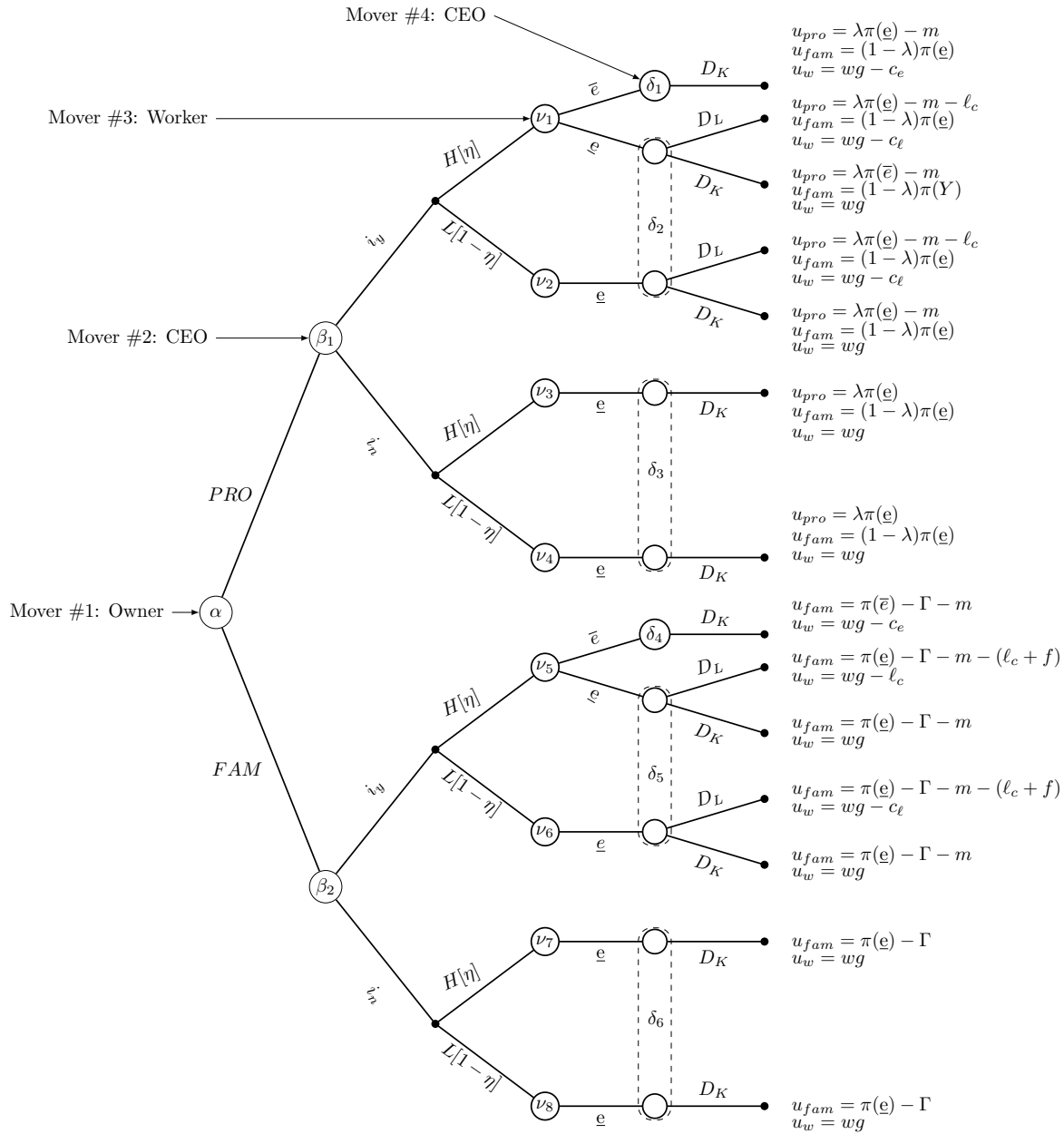


Figure A9: Parameters determining the four equilibria space, for $\eta = .2$ and $\eta = .8$

