ISSN 2042-2695

CENTRE *for* ECONOMIC PERFORMANCE

CEP Discussion Paper No 1528

January 2018

All in the Family?
CEO Choice and Firm Organization

Renata Lemos
Daniela Scur

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
Family firms are the most prevalent firm type in the world, particularly in emerging economies. Dynastic family firms tend to have lower productivity, though what explains their underperformance is still an open question. We collect new data on CEO successions for over 800 firms in Latin America and Europe to document their corporate governance choices and, crucially, provide causal evidence on the effect of dynastic CEO successions on the adoption of managerial best practices tied to improved productivity. Specifically, we establish two key results. First, there is a preference for male heirs: when the founding CEO steps down they are 30pp more likely to keep control within the family when they have a son. Second, instrumenting with the gender of the founder's children, we estimate dynastic CEO successions lead to 0.8 standard deviations lower adoption of managerial best practices, suggesting an implied productivity decrease of 5 to 10%. To guide our discussion on mechanisms, we build a model with two types of CEOs (family and professional) who decide whether to invest in better management practices. Family CEOs cannot credibly commit to firing employees without incurring reputation costs. This induces lower worker effort and reduces the returns to investing in better management. We find empirical evidence that, controlling for lower skill levels of managers, reputational costs constrain investment in better management

Key words: CEO, family firms, organisation, emerging economies
JEL: M11; L2

This paper was produced as part of the Centre's Growth Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

We 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 Abi Adams, Morten Bennedsen, Steve Bond, Serguey Braguinsky, Rachel Cassidy, Ian Crawford, Pascaline Dupas, Dave Donaldson, James Fenske, Katarzyna Habu, Michael Keane, Michael Koelle, Julien Labonne, Simon Quinn, Kalina Manova, Meg Meyer, Karlijn Morsink, Anna Sanktjohanser, Margaret Stevens and seminar audiences in Oxford, Stanford, IZA @ DC, UNSW, Stanford Empirical Management Conference, CSAE Conference, OxDev, RES Conference, RES Junior Symposium, Barcelona GSE Summer Forum, CCC at Bocconi, PacDev-Riverside, University of Toronto, York University and Lindau Nobel Laureate Meetings for very helpful comments and discussions. We particularly thank Nick Bloom, Raffaella Sadun and John Van Reenen for their support over the years.

Renata Lemos, World Bank and Centre for Economic Performance, London School of Economics.
Daniela Scur, University of Oxford and Centre for Economic Performance, London School of Economics.

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

1 Introduction

Family ownership and control is the world's predominant type of firm governance structure (La Porta et al. 1997, 1999, Faccio & Lang 2002). "Dynastic" family firms — where members of the founding family own a controlling share of the voting rights and have appointed a second-generation (or later) family member to serve as the CEO — account for up to a quarter of mid-sized manufacturing firms across countries. Although there is mixed evidence on whether dynastic family *ownership* is beneficial to firm outcomes (Bertrand & Schoar 2006), the weight of the evidence suggests that dynastic family *control* — that is, appointing a family CEO — is detrimental to productivity (Morck et al. 2000, Perez-Gonzales 2006, Bertrand et al. 2008, Bennedsen et al. 2007, Caselli & Gennaioli 2013, Cai et al. 2013). What explains this underperformance of dynastic family firms is still an open question. In this paper we study the relationship between dynastic family control, internal firm organization and firm outcomes. We develop a new survey to collect data on private firms across countries, and combine it with unique datasets on management and productivity that allow for a deeper understanding of the consequences of family control.

Our analysis has three parts. First, we start by presenting a new set of stylized facts that characterize the corporate governance choices of mid-sized manufacturing firms across the world. Second, we focus on the choice of CEO in dynastic successions and show the first causal estimates that dynastic family firms have fewer structured management practices. Such management practices have been widely shown to positively affect productivity and the management deficit we estimate implies a productivity decrease of 5 to 10%. Further, we present evidence that the relationship of management and productivity is similarly strong for the samples of family and non-family firms. We build a simple model to interpret why, despite the positive impact of management on productivity, dynastic family firms are less likely to adopt structured management practices. We propose that family CEOs cannot credibly commit to firing employees without incurring a utility cost — a reputation effect — which in turn induces lower worker effort and reduces the returns to investing in good management practices. We find empirical evidence that lower skill levels explains some of the gap in management adoption, but crucially we find that these reputational constraints also help explain the family CEO deficit.

The first part of the analysis presents a new set of stylized facts on corporate governance choices of mid-sized manufacturing firms across 35 countries. We document that family firms account for over half of mid-sized manufacturing firms in most low- and middle-income countries. Out of the family firms sample, we find that dynastic family firms — often the children of the entrepreneurs — account for only about a quarter of family firms in Asia and Africa, where the majority of firms are still first-generation (founder-run) firms. Latin American and OECD countries, however, have larger shares of second-generation (dynastic) firms — 42% and 52%

respectively. We also document the extent of family involvement in the management of family firms across countries. Our data suggests that dynastic firms have higher family involvement in management relative to first-generation firms, and much higher involvement relative to those that have remained family owned but hired professional CEOs.

Next, we focus on the choice of CEO in dynastic successions and show the first causal estimates that dynastic family firms adopt fewer structured management practices. We use data on the family characteristics of the outgoing CEOs for 810 firms that had at least one succession from a sample of 12 countries. We follow an Instrumental Variables approach, exploiting exogenous variation in the gender composition of the outgoing CEO's children as an instrument for dynastic CEO succession. Our results 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 0.8 standard deviations fewer structured management practices relative to firms with successions to non-family CEOs.

In light of strong evidence in the literature demonstrating that management practices are an important determinant of firm productivity (Bloom & Van Reenen 2007, Bloom et al. 2013, Giorcelli 2016), it is plausible that one of the reasons behind the financial underperformance of dynastic family firms stems from their apparent under-adoption of good management practices. Although it could be that these management practices matter differently — or not at all — for these firms, we find evidence that suggests otherwise. The literature has documented the correlation between management and productivity for the average firm — pooling family and non-family firms (Bloom et al. 2012, 2014) — and for founder-run firms (Bennett et al. 2015). We present a new set of correlations between structured management practices and firm outcomes focusing specifically on dynastic family firms for a sample of primarily European firms and also show the first such correlations for an important emerging economy: Brazil.

We find that, for a sample of over 6,000 firms primarily in Europe, the correlation between management and log of sales is strong and significant, suggesting approximately 6% higher sales for one standard deviation higher management quality. In the Brazilian sample, we find similar results for the correlation between management and sales in family firms, and an even larger correlation between management and value added, of 13%. Crucially, the coefficients for the sub-sample of family firms are not statistically different from the coefficients for the sample of non-family firms, suggesting the correlations of pecuniary returns to better management in family firms are no different to those of non-family firms. Furthermore, although these are not causal estimates, the correlations are strikingly similar to those found in the experimental literature (Bloom et al. 2013). Given the importance of management practices for firm outcomes, it is puzzling that these practices are not more widely adopted.

The third part of our analysis focuses on understanding why firms led by family CEOs adopt

fewer structured management practices. There are a number of reasons underlying the difficulties in effecting organizational change. Two mechanisms often ascribed to family firms relate to lower levels of skill of family CEOs (Perez-Gonzales 2006, Bennedsen et al. 2007, Bloom et al. 2013), and lack of awareness of managerial underperformance (Rivkin 2000, Gibbons & Roberts 2013). Bennett et al. (2015) show that skills and awareness alone fail to explain the full gap in management underperformance of firms run by founder CEOs, and we find a similar pattern when looking at dynastic family CEOs. However, neither of these potential mechanisms reflect fundamental characteristics of family CEOs that may help explain systematic differences between the incentive structure of family and non-family CEOs.

One well-established systematic difference between firms run by each type of CEO relates to the strength of implicit employment commitments with workers of their firms. The literature provides evidence of such implicit employment commitments, documenting that family firms provide better job security as a compensating differential for lower wages (Bassanini et al. 2010, Bach & Serrano-Velarde 2015), fare better in difficult labor relations settings (Mueler & Philippon 2011) and provide more within-firm wage insurance (Ellul et al. 2014). We explore how these implicit commitments may affect the incentives for adoption of management best practices and build a stylized model to serve as a guiding theoretical framework and help us organize our discussion of the empirical evidence on this possible mechanism. In our model, we have two types of CEOs: family and professional. All CEOs face an industry-specific cost of firing workers, but we assume family CEOs have implicit commitments to the workers of their firms, where employees do not expect to be fired. As a result, family CEOs would incur an additional cost of firing these workers (a "reputation cost"). There are two types of workers, high and low ability, who choose high or low effort. High ability workers exert high effort only when monitored, while low ability workers always exert low effort. We let structured management be analogous to adopting an improved monitoring technology that allows the CEO to observe a worker's effort choice.

Our additional insight is linking this higher cost of firing to the family CEO's (dis)incentive to adopt structured management practices. We build proxies for industry-level firing costs using industry unionization rates, and for firm-level reputation costs using eponymy — that is, whether the firm bears the family name (as Belenzon et al. (2017) used for first-generation firms). The model delivers three key predictions. First, family firms with high reputation costs will have worse management practices as well as lower separation rates: this is because the reputation cost makes it relatively more costly to fire workers and reduces the motivation to invest in management practices. Second, industries with higher costs of firing (ie. higher labour power) will have fewer firms with good management practices. This is because the higher common costs of firing reduce the incentive to invest in management practices for both types of CEOs. Third, industries with higher shares of high ability workers will have more firms with good management practices. This is because high ability workers shift their behaviour when monitored, so the larger share of workers who shift their behaviour in "high ability" industries serve as incentive

to invest in the monitoring technology. Using our rich combined dataset, we present a set of supporting stylized facts that are consistent with these predictions.

This paper contributes to the literatures on entrepreneurship, organization and process innovation, and their link to heterogeneity in firm outcomes. First, we add to the studies on the importance of family firms — in our case, broadly the children of the entrepreneurs — in the global economy. Beyond the cross-country works of La Porta et al. (1997, 1999), other studies have also documented the share of family firms in Europe (Faccio & Lang 2002, Claessens et al. 2000, Iacovone et al. 2015), Asia (Cai et al. 2013), and the US (Anderson & Reeb 2003). We overcome the common limiting factor of dearth of data by hand-collecting new data and building first links across multiple rich datasets and show that dynastic family firms make up a substantial share of mid-sized manufacturing firms across the world. In terms of productivity, the literature focusing on the effect of family ownership — rather than control — offers mixed evidence, including findings of no relationship (Demsetz & Villalonga 2001), an inverse-u relationship (Morck et al. 1988), a negative relationship (Miller et al. 2007, Morck et al. 2000, 2005, Caselli & Gennaioli 2013) and a positive relationship (Claessens & Djankov 1999, Anderson & Reeb 2003, Khanna & Palepu 2000, Sraer & Thesmar 2007). When considering the relationship between dynastic family *control* and productivity, however, it is clear that CEO "style" matters (Bertrand & Schoar 2003) and the weight of the evidence points to a negative relationship between dynastic family CEOs and firm outcomes (Claessens et al. 2002, Perez-Gonzales 2006, Villalonga & Amit 2006, Bertrand & Schoar 2006, Bertrand et al. 2008, Cai et al. 2013, Bandiera et al. 2012). Closest to our study is Bennedsen et al. (2007), where the authors 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 considering the effect of dynastic CEO succession on management practices, and also collecting the first such family characteristics data for firm managers of non-Scandinavian countries.

Second, we contribute to the literature on innovation in organizational processes — such as management practices — and productivity. Alexopoulos & 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. At the firm level, a number of papers find large variations in management practices across firms are strongly associated with differences in performance (Bloom, Sadun & Van Reenen 2015, Bloom & Van Reenen 2007, 2010, Bloom et al. 2013, Giorcelli 2016), and also that there are large differences in the quality of management across firms and CEO types (Ichniowski et al. 1997, Black & Lynch 2001, Bertrand & Schoar 2003, Bandiera et al. 2012, 2017, Kaplan & Sorensen 2017). Our paper bridges the two sets of findings and suggests that an important reason behind the lower productivity outcomes of dynastic family firms could stem partially from their under-adoption of these management process innovations. We add to correlational evidence in Bloom

et al. (2014) of this underperformance in dynastic family firm management by presenting the first causal estimates of the effect of a dynastic family CEO succession.

Third, we go beyond the suggestions thus far that a key reason for underperformance is the family CEO's lack of skills (Bennedsen et al. 2007, Bloom et al. 2013, Bennett et al. 2015) and consider the role of implicit employment commitments in family firms, thus also contributing to the literature on family firms and labour relations. To be sure, we find evidence that family CEOs have less formal education, but that it fails to fully explain family firms' underperformance. The literature suggests that family firms fare better in environments with difficult labour relations and provides evidence of stronger implicit employment commitments with employees via better job and wage security relative to non-family firms (Mueler & Philippon 2011, Ellul et al. 2014, Bassanini et al. 2010, Bach & Serrano-Velarde 2015). We add to this literature by proposing that these implicit commitments act as a reputational constraint on the adoption of better management practices.

The remainder of this paper is organized as follows: Section 2 describes the key datasets used, characterizes the organizational choices of family firms, and, to motivate the following section, presents descriptive evidence on the relationship between management and productivity across family and non-family firms. Section 3 reports the empirical results of the causal relationship between a dynastic family CEO succession and adoption of good management practices. Section 4 outlines a theoretical framework to guide the empirical analysis of possible mechanisms behind family firms' relatively poor management practices. Section 5 concludes.

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 ownership and control history of successions the firm has had since its inception.[2] 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. To determine ownership, the interviewees are asked to describe who ultimately owns the firm, and the interviewer is instructed to probe enough to find out who the single largest shareholding is and whether they own more than 25% of the controlling shares.[3]

[2]Existing M&A databases, such as Zephyr and SDC Platinum only collect data on changes in *ownership* rather than changes in control. Fons-Rosen et al. (2008) have created a combined panel dataset using Zephyr data, and Bena et al. (2008) also developed an algorithm to create a Pyramid Ownership Structures dataset. Beyond the Scandinavian matched census datasets, however, there are no datasets that we are aware of that collect data on successions of *control* (rather than simply ownership), and include family characteristics of CEOs.

[3]We use the "25% of voting shares" threshold for majority ownership following what other firm surveys such as the World Management Survey and the Executive Time Use survey have done, though it is a higher bar than

Table A1 in the Appendix gives an overview of the ownership categories. In short, if the founder or the descendants of the founder own the firm and a family member is the CEO, we classify the firm under "family control".[4] If the shares of the firm are owned by one or many individuals and the CEO is not related to them, we classify the firm as "non-family control." If a firm is owned by a family but has a professional CEO, we classify them under the "non-family control."

The sampling frame of the Ownership Survey (OS) was the sample of firms interviewed in the World Management Survey (WMS), a cross-country data collection project described below. The sampling frame includes manufacturing firms with more than 50 employees. The OS pilot survey was carried out in 2013, and since then we have applied a portion of the questions alongside the 2014 and 2015 waves of the World Management Survey (WMS). We also hand-collected additional data and codified as many of the CEO information for previous waves of the WMS as possible. In the combined dataset, we have CEO information for 2710 firms across 17 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 810 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 (818 succession points in total). This latter sample is the one we use for the IV analysis. Table A2 shows the distribution of ownership and control across the firms in the OS sample, while Table A3 shows the full sample sizes by country and region.

Starting from the full WMS sample of over 10,000 firms, Figure 1 uses the full dataset and presents a description of ownership structures in mid-sized firms across 35 countries. Two key observations emerging from this graph are: (i) middle- and low-income countries have a much higher share of family firms; (ii) when looking at mid-sized firm range, the firm size distribution is not particularly different across countries, as evidenced by the similar circle sizes representing median firm size. Figure 2, in turn, uses only data from founder- and family-owned firms and disaggregates the share of firms controlled by each of three types of CEOs: first generation founder CEOs, second generation dynastic family CEOs and professional CEOs. Nearly 70% of firms in Asia and Africa are first-generation, while the share is lower in Latin America and much lower in OECD countries. In the latter two regions there is a higher share of dynastic family CEO firms, with such firms accounting for 42% and 52% of firms in each region respectively. Professional CEOs are not common in family firms, but they tend to appear more in European and Anglo-Saxon firms than elsewhere, as predicted by Burkart & Panunzi (2006).

We turn next to documenting family involvement in managerial positions within family firms across regions. As our focus is on dynastic firms, we calculate the average family involvement for family owned firms with either a dynastic family CEO or a professional CEO within each global

La Porta et al. (1997) set at 10%.

[4]Likewise, if a firm was sold to another entity (person or another family), and that entity (the new owner or a family member of the new owner) holds the CEO position, the firm would also be classified under "family control", though there were only two instances of this.

region, and present the averages relative to the involvement in first-generation founder firms. The pattern in Figure 3 suggests that when firms professionalize the top tiers of management, they also do so throughout the managerial ranks. Firms owned by families but who have professional CEOs have substantially lower average involvement of family members in management relative to the average for founder CEO firms in the region. Firms owned by families with a family CEO, however, either retain the same average number of family members involved (Anglo-Saxon and European countries) or increase it (African, Asian and Latin American countries).[5]

2.2 Organizational data: the World Management Survey

The World Management Survey is a unique dataset that includes levels of structured management practices from over 10,000 manufacturing firms collected from 2004 to 2015 across 35 countries. The WMS methodology uses double-blind surveys to collect data on firms' use of management practices and focuses on medium- and large-sized firms, selecting a sample of firms with employment of between 50 and 5,000 employees.[6] The median firm size across countries ranges between 200 and 300 employees. The project is among a surge of emerging research on this subject, which has moved beyond selective case studies to collect systematic data on this topic.

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 combination of many of these indicators reflects "good formal structured management practices" as commonly understood, and our main measure of management in this paper represents the average of these 18 scores. 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.

Crucially, 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 systematically on a set scale. Thus, the survey captures the degree of usage rather than the manager's opinions and abstracts 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. The survey does not capture performance data, and researchers have to rely on external datasets and match them to

[5] Figure A1 in the Appendix shows the average number of family members involved by region.

[6] The WMS methodology was first described in Bloom & Van Reenen (2007). Survey instrument available at www.worldmanagementsurvey.org.

the WMS data. A more thorough description of the WMS is provided in Appendix B.3.[7]

To build the management index we create z-scores for each of the 18 ordinal management practices, then take the average across them and again take the z-score of this sum to proxy for level of management. We refer to this variable as "z-management" in all our regression tables and interpret the coefficients in terms of standard deviations of management.[8] The standard deviation of the full WMS sample is 0.66 points.

2.3 Family CEOs and firm performance: descriptive evidence

Our main aim in this paper is to explore whether the appointment of family versus non-family CEOs affects the quality of management in manufacturing firms and why that might be the case. Establishing a causal relationship between quality of management and *productivity* has been the subject of a prolific parallel research agenda and is outside the scope of this paper.[9] However, it is important for us to be able to put our results into context to motivate our research question — specifically, we provide descriptive evidence on the correlation between firm productivity and management for the sample of family firms.

One hypothesis is that family firms might be systematically different from other firms and not need management practices in the same way to be optimally productive. If this were the case, we would expect to find no significant relationship between management and productivity in the sample of family firms. The best evidence to date on the topic is the Bloom et al. (2013) management experiment with firms in India, all of which were family firms. They find that the treated firms who adopted a set of better management practices (in many ways parallel to those used in this paper) improved their productivity by 17% in the first year. To supplement the experimental findings, 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.

The performance data used in this section comes from two sources: first, we use production data from the Bureau van Dijk's Orbis database, one of the most comprehensive databases of public and private firm information available. This database aggregates information from public accounting data in corporate annual reports, and is most comprehensive for European countries because of the relatively more stringent private firm reporting requirements in the continent. Nearly 80% of the matched sample in this section comes from European and Anglo-Saxon coun-

[7] The WMS data has been collected in waves with cross-sections of firms in new countries added every wave as well as panel data for selected countries.

[8] This is the conventional approach in the literature using this data, but we have also tested the results using the Principal Component instead and the results are robust.

[9] See, for example, Bloom et al. (2013).

tries[10] with the remaining 17% from Asia[11] and 3% from Latin America.[12] In total, 6,125 firms from the WMS sample match with production data from Orbis and include information on gross sales, employment and capital (tangible fixed assets). Second, we use the Brazilian Industrial Census (PIA) data from 1999 to 2014 and match it to over 500 Brazilian firms covered in the WMS. The census includes measures of firm gross sales, firm value added, a measure of capital and of intermediate inputs.[13]

Starting with the larger dataset of developed countries from Orbis, we present the descriptive relationship between dynastic family control and firm performance. We use log of sales as the measure of firm performance, and create a set of indicators for each category of ownership and control. Our indicator of interest is for firms that are family owned and have a second-generation family CEO ("dynastic family CEO"), and table 1 reports the summary results.[14] Column (1) shows the baseline relationship between firm performance and dynastic family control. The coefficient suggests that having a dynastic CEO is correlated with 37% lower sales, relative to a private firm with a professional CEO (reference category). Column (2) reports the results of a Cobb-Douglas OLS specification, including measures of log of capital and log of labor, along with country fixed effects, log of firm age and an indicator for multinational status. The coefficient reduces substantially to -0.113, though it remains significant. Including industry fixed effects further explains the gap in performance, but still suggests dynastic family CEO firms have, on average, approximately 8% lower productivity. Column (4) includes our standardized measure of management practices, which absorbs a substantial portion 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. Column (5) includes an interaction between management and the dynastic family CEO indicator to consider whether management "matters" differently for dynastic firms. The coefficient on the interaction term is small and not significant, and the coefficients on management and the dynastic family control indicator show barely any change from column (4). Finally, columns (6) and (7) repeat the specification in column (4) with the sample of dynastic family firms and the sample of non-family firms respectively. The coefficient on management is not statistically different between the two specifications.

As a result of the data limitations described above, the analysis presented above focuses primarily on developed countries and is limited to a cross-sectional data. As family firms are particularly ubiquitous in emerging economies, we present further descriptive results from matched data from

[10]Countries include: Australia, France, Great Britain, Germany, Greece, Ireland, Italy, Northern Ireland, New Zealand, Poland, Portugal, Sweden, United States.

[11]Countries include: China, India and Japan.

[12]Countries include: Argentina, Brazil, Chile and Mexico.

[13]The capital variable is not part of the census survey but has been constructed by *Instituto de Pesquisa Econômica Avançada* (IPEA), a Brazilian economic research institute and provided to us by request in the Brazilian confidential data use room.

[14]Table A5 in the Appendix reports the results for all ownership category indicators.

one large emerging economy: Brazil. We argue that Brazil is an ideal context in which to study family firm management for three main reasons. First, it is a large and economically important country in a developing region and also has a large proportion of family firms (compared to the US/UK where only 20-30% of firms are founder or family owned). Second, it is one of the countries for which we have the largest number of data points for ownership and firm organization, and third, the data both exists and is accessible. As the Brazilian Census data has both panel data available as well as more detailed measures of intermediate inputs, we run both a Cobb-Douglas OLS specification as well as a Levinsohn & Petrin (2003) specification, using inputs to control for unobservables. There is a vast literature on estimating production functions and a number of papers that use the Brazilian industrial census.[15] 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 2 reports the descriptive results of this additional exercise. For the Brazilian WMS sample, a standard deviation is 0.647 points. Turning first to the OLS models in columns (1) through (4), we 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. Columns (5) through (6) repeat 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 & Petrin (2003) model. The relationship between management and productivity in both family and non-family firms remains robust to using a different model specification.

Taken together, the results suggest that there is a meaningful relationship between management and productivity across a range of countries, and, crucially, for the samples of both family and non-family firms. Although this analysis is only a set of descriptive conditional correlations, we take it along with Bloom et al. (2013) experiments as evidence that improving the quality of the management practices we measure here is likely to improve firm performance — even in family firms. This should appease concerns that there is something happening within the organization of family firms that makes such practices irrelevant, and serve as evidence against the argument that family firms "do not need" this type of management. Rather, we suggest that poor management practices could be a reason behind at least part of the poor performance of family firms vs. non-family firms documented elsewhere in the literature.

[15] For a summary, see Marc-Andreas Muendler's website at http://econweb.ucsd.edu/muendler/html/brazil.html

3 Dynastic family firms and management practices

Figure 4 shows the distribution of management quality for family firms led by a family CEO, family firms led by a professional CEO and non-family firms. It is clear that the choice of CEO is an important determinant of management quality. The Kolmogorov-Smirnov test of equality of distributions suggests that the distribution of management quality in non-family firms is not statistically different from the distribution of management quality in family owned firms led by a professional CEO. The test also suggests that both distributions are statistically different from the family owned and led distribution of management. A number of factors could be driving this relationship, though. For example, if only the worst firms have family CEOs because nobody except a family member would accept running the firm, we would see this pattern but it would not be caused by the family CEO. To overcome this limitation of a simple correlational analysis, in this section we use an instrumental variables approach to explore the question of whether worse management is indeed a consequence of a succession to a family CEO.

For this analysis, we use the firms in our Ownership Survey sample that have had at least one succession of control and were founded by a family. Table 3 shows the main descriptive statistics of the sample of firms used, and the difference in means between family and non-family firms. As the literature suggests that the "family behind the family firm" drives important differences in firm governance (Bertrand & Schoar 2006, Bertrand et al. 2008), we turn first to the family characteristics of the outgoing CEO. We see evidence that the characteristics of the former CEO's children in family vs. non-family firms are significantly different from each other. On average, outgoing CEOs of firms that switched to non-family control are likely to have fewer children and likely to have fewer boys. Crucially, however, conditional on the first child being male, the average family size is not statistically different between the two groups. Table A4 in the Appendix reports the summary statistics for the key dependent and independent variables in our empirical model in more detail.

Turning to firm characteristics, we report the means and difference in means for the set of factors that have been shown to have a correlation with managerial structures, as in Bloom et al. (2014). Firms in the two groups are not significantly different from each other in terms of firm size, with means of 463 and 545 employees for family and non-family firms respectively, or firm age with means of 51 and 46 years respectively. In terms of the proportion of employees who have college degrees, non-family firms tend to have a slightly higher proportion, 14% for non-family firms versus 11% for family firms, though the difference in means is weakly significant. Over half of non-family firms are multinationals while only 12% of the family firms fall under the same category. Breaking down the manufacturing industries into high tech and low tech, we find that the share of family firms is higher in low tech industries than in high tech industries.

We also check the difference in means of a set of other firm organizational characteristics beyond

those that are known in the literature to be correlated with management practices. The means of firms in the family and non-family groups across several variables are not statistically different from each other, including a measure of span of control (number of direct reports to the plant manager), average hours worked per week by managers and number of production sites (at home and abroad). Non-family firms seem to be more hierarchical, with on average a larger number of levels between the CEO and the shopfloor. Finally, there is a difference in the average number of hours worked by non-managers, with workers in family firms working three quarter of an hour longer on average.

3.1 Correlational evidence: OLS

We first use the full World Management Survey dataset and run the OLS model below, and subsequently restrict our sample to only firms that have had at least one succession of control and use an IV approach. The OLS results are reported in Table 4.

$$M_{isc} = \alpha + \boldsymbol{\beta_1'}\mathbf{Family_{isc}} + \boldsymbol{\beta_2'}\mathbf{NonFamily_{isc}} + \boldsymbol{\theta'}\boldsymbol{V_i} + \omega_s + \delta_c + u_{isc} \quad (1)$$

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 (1st generation) CEO," while non-family firms are subdivided into "privately owned, professional CEO" and "family owned, professional CEO." 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.

Columns (1) through (3) use the full WMS sample. Column (1) shows the baseline relationship between the sub-categories and management excluding all controls, while Column (2) includes industry controls and Column (3) includes firm and noise controls. The industry controls only slightly reduce the coefficients, but firm and noise controls account for a more substantial share of the variation. The estimates in Column (3) suggest that the average family owned, family CEO firm has 0.289 standard deviations worse management than the average dispersed shareholder firm. The average founder owned, founder CEO firm has 0.320 standard deviations worse management than the average dispersed shareholder firm. We also observe that firms with professional CEOs, either family or privately owned, are also worse managed than dispersed shareholder firms (coefficients of -0.097 and -0.155, respectively) but better managed than firms with family CEOs.

Columns (4) and (5) are restricted to only the countries that are also used in the IV analysis below, and Column (6) uses only the firms within these countries that are included in the IV specification. The sample we use for our IV approach is based on there being at least one *change in CEO* (or, succession of control) and also for which we have enough family history data (that is, data on our instrumental variables). Further, we can only use successions that have at least one matching data point in the World Management Survey (WMS) dataset. All considered, our final dataset is a cross-section of 818 successions from 810 firms, where we have information on the outgoing CEO's family characteristics (that is, a $t-1$ family information).

The coefficients in Column (4) are similar to those in Column (3). The exception is that the coefficient on family owned, professional CEO firms is no longer significantly different from dispersed shareholder firms though the point estimate is still similar and this might simply be reflecting a noisier estimate as a result of the lower number of this type of firm in the particular subset of countries we study. Columns (5) further restricts the sample to exclude founder firms from the sample of all firms in the "IV countries," and Column (6) shows results using only the sample of firms that are also used in the IV analysis.

The purpose of this exercise is to show that the pattern of poor management practices in dynastic family CEO firms is persistent across several subsamples of the data. This negative and systematic relationship is not as clear for other types of ownership and control.[16] The coefficient in Column (6) suggests that family-controlled firms in our analysis sample have, on average, 0.37 standard deviations worse management than dispersed shareholder firms. This is equivalent to about 56% of the standard deviation in the full management dataset.

We also check for the equality of the coefficients within and between the two broader categories of firms by conducting a parameter test of the equality of coefficients and provide results at the bottom of the table. We first test the equality of the coefficients within each category of control, that is, a comparison of (i) dynastic family CEO and founder CEO; and of (ii) family owned, professional CEO and privately owned, professional CEO, showing that for Column (3) we cannot reject the hypothesis that the coefficients are significantly different from each other within each category. We also test for the equality of coefficients between the two broader categories, that is, testing whether family firms controlled by family CEOs and professional CEOs. We find that we can reject the null hypothesis that they are equal in specifications (1) to (5), and can nearly reject the null hypothesis in Column (6), despite the noisier data. This analysis suggests that the combination of several sub-categories into two major categories based on who *controls* the firm and not who *owns* the firm is reasonable for the purposes of this study.

[16] Although our identification strategy by design excludes founder firms, the coefficients on the relationship between founder-owned, founder CEO firms and management are not statistically different from that of family owned, family CEO firms and management. The similarity of the relationship between "first generation" family firms and "second generation onwards" family firms will inform our discussion of external validity at the end of this paper.

3.2 Causal evidence: Instrumental Variables approach

We cannot infer causality from a simple OLS model as there are several reasons why the OLS results could be biased. There could be omitted variable bias where there is some factor driving both CEO choice and management quality. On the one hand, if the firm is able to stay alive as a family controlled firm in a competitive environment, there is likely some positive productivity shock that both drives CEO choice and their choice of management practices. On the other hand, if only the worst firms are passed down to family CEOs because no professional CEO would accept taking the job, we would expect a negative bias. There could also be reverse causality, as it is possible that different control structures — say, less concentrated control — leads firms to have better management practices, but it is also possible that better management in turn allows firms to transition to control structures with, say, less concentration of control at the top. In short, it is difficult to pin down the real effect of family control on firm performance and organization from an OLS analysis.

In order to establish the true effect, we need to find a source of variation in family control that is exogenous to the level of managerial structures in a firm. One instrument that is particularly useful in determining family control is the family characteristics of the outgoing owner-CEO. In particular, we explore the gender composition of the children of the former owner-CEO as identifying variation. We use three main variations of this instrument: (a) a dummy variable for whether there was at least one son among the children, conditional on the number of children (b) the number of boys, conditional on number of children, and (c) a dummy variable for whether the first child was male. The rationale is that if the owner-CEO has a male child he is more likely to keep the firm under family control.[17] The gender of the first child instrument has been used by Bennedsen et al. (2007) with Danish data of family firms CEOs, for example.

By design, this IV strategy requires that at least one succession of power has taken place. More specifically, at the point where a family owner-CEO makes the decision to pass control of the firm to the next generation of family members, hire a professional CEO or sell the firm outright, we posit that this decision is heavily influenced by the gender composition of the CEO's children. Essentially, we are comparing "stayers" with "switchers". The "stayers" are firms that stay with combined ownership and control — that is, family owned firms with family CEOs.[18] The "switchers" are firms that were founded by a founder/founding family, but have since "switched" into separate ownership and control, that is, where the CEO is not related through family ties to the majority shareholders of the firm. We use the measure of quality of management of the firm to be contemporaneous with the CEO presiding during that time, and the information on the gender of the preceding CEO's children as the identifying variation.

[17] We say 'he' throughout because the vast majority of founder/family owners and CEOs in our sample are, in fact, male.

[18] Because we need at least one "switch" to have happened, although we consider founder owned and controlled firms under the category of "combined" ownership and control they are not part of our IV strategy.

The dependent variable of the first stage of our two stage least squares (2SLS) strategy is $FamilyCEO_i$, a dummy variable that takes a value of 1 when the firm has a dynastic family CEO and 0 when it does not. The first instrument, HAD_SONS_i is a dummy variable that takes a value of 1 if the outgoing CEO had at least one son. The second instrument, $SONS_i$ is the number of sons the former owner-CEO had, entered as a step function. The third instrument, $FIRST\_SON_i$, is a dummy variable that takes a value of 1 if the former owner-CEO had a male first child and 0 if not. $\boldsymbol{X_i}$ is the vector of firm controls. The first stage equations are as follows:

$$FamilyCEO_i = \alpha_h + \rho_h HAD\_SONS_i + \vartheta_h children_i + \boldsymbol{\eta_h'} \boldsymbol{X_i} + \nu_{h,i} \tag{2}$$

$$FamilyCEO_i = \alpha_{as} + \sum_{j=1}^{3} \rho_j SONS_j + \vartheta_{as} children_i + \boldsymbol{\eta_{as}'} \boldsymbol{X_i} + \nu_{as,i} \tag{3}$$

$$FamilyCEO_i = \alpha_f + \rho_f FIRST\_SON_i + \boldsymbol{\eta_f'} \boldsymbol{X_i} + \nu_{f,i} \tag{4}$$

The second stage regression of the impact of family control on the quality of management is:

$$M_i = \alpha_{ss} + \beta_f \widehat{FamilyCEO_i} + \vartheta_{ss} children_i + \boldsymbol{\phi'} \boldsymbol{X_i} + \epsilon_i \tag{5}$$

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 $\boldsymbol{X_i}$ is the set of firm-level controls. The coefficient of interest is β_f: the effect of family control on quality of management. Table 5 shows a summary of the OLS and IV results. Column (1) shows the OLS regressions using the same sample as in the main IV specification, using only the Ownership Survey data that can be matched to the World Management Survey and has full information on the instrumental variable. Column (2) shows the reduced form using the instrument from our preferred IV specification.

The bottom panel of table 5 shows the first stage results for the three main instruments we use in Columns (3) to (5), and repeats the results for the instrument with the most straightforward interpretation — whether there was at least one son — in Columns (6) to (8). The first stage is essentially a linear probability model of the probability that the firm had a family control succession, conditional on the previous CEO having at least one son (Columns 3, 6-8) or the first child being male (Column 5).[19] Column (4) shows the first stage results for using the number of sons as the IV. In this specification the number of sons enters as a step function, with dummy variables for each number of sons.

[19] As suggested by Angrist & Pischke (2009). We use Stata's `ivreg2` command, by Baum et al. (2002) to estimate these regressions.

Still focusing on the bottom panel, Column (3) of table 5 suggests that, controlling for number of children, a firm is approximately 30 percentage points more likely to have a succession to a family CEO if the previous CEO had at least one son. The Kleibergen-Paap Wald F-statistic test for weak instruments is 21.58, well above the Stock & 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%.[20]

Column (4) shows the results of using the number of sons as an IV. The coefficients and significance levels are similar to those of the "had sons" IV in Column (3), predicting an approximate 30 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. Because we have multiple instruments here we report the Sargan-Hansen test of over-identifying restrictions resulting Hansen's J statistic (because of the clustered standard errors) and corresponding p-value. We cannot reject the joint null hypothesis that the instruments are valid. However, this specification seems to have weaker instruments than our preferred specification as suggested by the lower Kleibergen-Paap Wald F-statistic of approximately 7.6.

In Column (5) we use the gender of the first child as the instrument. The coefficient suggests that having a male first child is associated with a 12.4 percentage points higher probability of the firm remaining under the control of a family CEO. Considering the weak instruments test, the Kleibergen-Paap statistic sits between the specifications in Columns (3) and (4) with a statistic of 11.37.

The top panel of table 5 shows the second stage results, along with the OLS results and reduced form. The results in Column (3) suggest that a succession to a family CEO leads to 0.808 standard deviations worse management practices, significant at the 5% level (p-value: 0.037). The coefficients of the different iterations of the IVs are similar to each other, and not statistically different. 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 imprecisely estimated.

In Columns (6) to (8) we break down the WMS management score into its three main components, including operations & monitoring, target setting and people management. We see that the coefficients are broadly consistent with the overall management measure, suggesting the negative relationship between a family succession of control and management is not likely to be driven by any one particular sub-area of management, but rather is a more general effect. Table A6 in the Appendix repeats the analysis including sampling weights and different functional forms of the

[20]The Kleibergen-Paap Wald statistic (Kleibergen 2002, Kleibergen & 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, Baum et al. (2007) suggests that the Stock & Yogo (2005) critical values for the Cragg-Donald Wald F-statistic could be used and thus we report them here to facilitate comparison.

instrumental variables; the results are broadly consistent in terms of coefficient magnitude and direction of sign.

3.3 Instrument informativeness

Although the results from the first stage are economically meaningful and statistically significant, in this section we present further statistics supporting the informativeness of our choice of instruments. At a glance, it is clear that the strongest instrument we have is the dummy variable for whether the outgoing CEO had at least one son or not, conditional on the total number of children. The results suggest that having at least one son is associated with an approximately 30 percentage points higher chance of a family control succession. In the countries that we study, the gender of the *first child* is not as strong a predictor of family succession, with a male first child predicting only a 12.4 percentage points higher chance of family control.

Figure 5 breaks down the firm control succession by the number of sons of the former CEO. We have restricted the sample used in this graph to only those used in the IV analysis. Even when there are no sons in the family, control tends to be passed to other male family members or to professional CEOs (either through external hires or firm sale) rather than daughters.

3.4 Exclusion restriction

The exclusion restriction would fail if the gender of the CEO's children was directly related to any part of our measure of quality of management. 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.[21] In terms of the instrument using the number of sons or the dummy variable of at least one son, it could be argued that more devoted CEOs continue having children until they have a son to pass the firm on 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 better (or worse) management. We address this potential issue in two ways.

First, we consider the relationship between desire for a male child and family size (i.e. number of children). 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 male. Figure 6 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 much of a concern

[21] Although it has been noted to us that studies have shown that there are other external factors that might affect the gender of children *in utero*, such as testosterone levels of the parents.

in the historically catholic countries studied here (the p-value of the Kolmogorov Smirnov test of equality of distributions is 0.955).[22]

Second, we argue that the level managerial structures is not obviously 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. This could be a problem when looking at outcomes that could be affected more directly by a CEO's higher effort (ie. time spent) to leave a legacy to their children — such as sales or profits. Management, however, is an outcome that simple CEO effort or sheer determination has a much less straightforward effect on, as drivers of better management are not as simple as spending more time at work. Although it could be that more devoted CEOs also spend more time to increase their own levels of education — noted in Bloom et al. (2014) as one of the drivers of good management — this is likely to take some investment time and it is unclear it would yield large enough changes in the short run that would upset the validity of our IV.[23] In short, even if the founders chose to have more children because they were keen to keep the firm in the family, it is less obvious that this also determines the quality of management practices they choose to adopt in the firm, thus making variations on the gender composition of children a plausible set of instruments.

4 Mechanisms: why do dynastic family firms have worse management?

The result that dynastic family CEO firms are less well managed leaves us with a puzzle. If the management practices we study lead to better firm performance, why are firms not already adopting them? The third part of our analysis focuses on understanding why this is the case . There are a number of reasons underlying the difficulties in effecting organizational change. Two mechanisms often ascribed to family firms relate to lower levels of skill of family CEOs (Perez-Gonzales 2006, Bennedsen et al. 2007, Bloom et al. 2013), and lack of awareness of managerial underperformance (Rivkin 2000, Gibbons & Roberts 2013). Bennett et al. (2015) show that skills and awareness alone fail to explain the full gap in management underperformance of firms run by founder CEOs, and we find a similar pattern when looking at dynastic family CEOs.

We present the results of this analysis in table 6. The World Management Survey includes two relevant measures of awareness and skills. The first proxy variable comes from the self-scoring variable collected at the end of the WMS interview. After an interview that lasts for at least

[22] See (Bassi & Rasul 2017) for evidence on faith-based fertility decisions in Brazil, for example.

[23] See Bandiera et al. (2012) for evidence on CEO time use. New 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.

an hour, the interviewer asks the only personal opinion question of the survey: "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. The results suggest that although both proxy variables are correlated with better management, both fail to explain much of the gap in management quality in dynastic family firms.

Crucially, neither of these potential mechanisms reflect fundamental characteristics of family CEOs that may help explain systematic differences between the incentive structure of family and non-family CEOs. However, one well-established difference between firms run by each type of CEO relates to the strength of implicit employment commitments with workers of their firms. The literature provides evidence of such implicit employment commitments, documenting that family firms provide better job security as a compensating differential for lower wages (Bassanini et al. 2010, Bach & Serrano-Velarde 2015), fare better in difficult labor relations settings (Mueler & Philippon 2011) and provide more within-firm wage insurance (Ellul et al. 2014). In in table A7 of the Appendix, we use administrative data from Brazil to show further evidence that family firms pay lower wages, consistent with the literature that there is likely some compensating differential within family firms, such as longer job tenure.[24] Thus, we explore how these implicit commitments may affect the incentives for adoption of management best practices and build a stylized model to serve as a guiding theoretical framework and help us organize our discussion of the empirical evidence on this possible mechanism.

4.1 Model: dynastic family CEOs and reputation costs

Consider a game with three players: the owner, the CEO and the worker. An action set for an owner is a binary choice $Mg \in \{PRO, FAM\}$, where $Mg = PRO$ means the owner hires a professional CEO, and $Mg = FAM$ means the owner choses to manage the firm herself and acts as a family CEO.

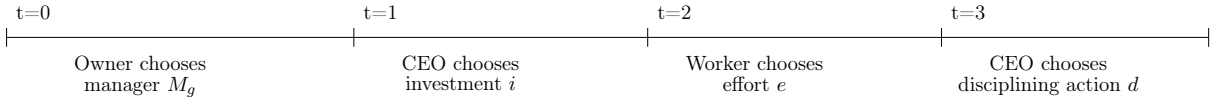
An action for a CEO is a pair: an investment choice, i, and a disciplining choice, d. The investment choice is a binary investment choice $i \in \{i_y, i_n\}$, where $i = i_y$ denotes investment in the monitoring technology (i.e. management practices) and $i = i_n$ denotes no investment. The disciplining choice is a binary choice $d \in \{D_K, D_L\}$, where $d = D_K$ denotes keeping the worker, and $d = D_L$ denotes firing the worker. An action for worker is a binary effort choice, $e \in \{\overline{e}, \underline{e}\}$. The worker is hired by the CEO and is not a family member.

The worker 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. For any given

[24] We do this using *RAIS*, a Brazilian administrative dataset that covers all formal employment in Brazil.

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

The model's timeline of the order of the actions is presented below. Consider a firm owner at $t = 0$, and the owner moves first to choose a manager (family or professional). 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 monitoring, 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 allows the CEO to observe the worker's effort level, the technology has a fixed cost and it is only worth implementing if the CEO uses the information to discipline (fire) 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 doing so. Crucially, the model does not assume that professional CEOs are of higher ability than family CEOs, distinguishing this model from others such as Burkart & Panunzi (2006). This model allows CEOs to be of similar ability and consider alternative explanations behind the observed lower levels of profitability under the assumption that they are making rational and informed choices.[25] Here, profits are a function of worker effort and are higher when CEOs invest in monitoring because it induces higher worker effort.[26]

4.1.1 Payoffs

Workers The payoff of a worker is a function of effort, wages and the disciplining decision of the CEO. Let the utility function for the worker be:

[25] Conceptually, 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.

[26] It abstracts from the possibility that workers in family firms can have intrinsic motivation at this point.

$$u_w = \begin{cases} W & \text{if } e = \underline{e} \text{ and } d{=}D_K \\ W - c_e & \text{if } e = \overline{e} \text{ and } d{=}D_K \\ W - \ell_w & \text{if } e = \underline{e} \text{ and } d{=}D_L \\ W - c_e - \ell_w & \text{if } e = \overline{e} \text{ and } d{=}D_L \end{cases} \tag{6}$$

where W is the worker wage, c_e is the cost of effort if the worker chooses to exert effort ($e = \overline{e}$), and ℓ_w is the fixed utility cost of being laid off if the CEO chooses $d = D_L$.

CEOs The payoffs are specified for the family CEO and the professional CEO separately below, but note how they follow the same structure. Let the cost of firing workers that is common to all CEOs be exogenously set at ℓ_c, let us call it the "industry cost". Family CEOs incur an additional cost of firing workers, f, called the firm reputation costs. Let the cost of investment in the monitoring technology be m. Let firm profits be a function of worker effort: $\pi(e)$.

Professional CEO: Professional CEOs are paid a share of profits, $\lambda\pi(e)$, as their compensation. λ is exogenously set. The professional CEO's cost of effort in running the firm is embedded in the contract design and the "wage" she has accepted the contract at. The payoff of a professional CEO is a function of wages $\lambda\pi(e)$, cost of adopting management m, and cost of firing workers ℓ_c.[27]

$$u_{pro} = \begin{cases} \lambda\pi(e) & \text{if } d = D_K \text{ and } i = i_n \\ \lambda\pi(e) - \ell_c & \text{if } d = D_L \text{ and } i = i_n \\ \lambda\pi(e) - m & \text{if } d = D_K \text{ and } i = i_y \\ \lambda\pi(e) - \ell_c - m & \text{if } d = D_L \text{ and } i = i_y \end{cases} \tag{7}$$

Family CEO: The family CEO incurs a cost of effort of running the firm $c_{Mg} \in [0, 1]$, but unlike the professional CEO she also accrues a private utility benefit from controlling her family firm, $B \in [0, 1]$. Let Γ be the net utility cost of control: $\Gamma = c_{Mg} - B \in [-1, 1]$.

Because of the implicit commitments, the family CEO incurs an additional cost of firing workers: a firm reputation cost f. The payoff of a family CEO is a function of the profits of the firm $\pi(e)$, the cost of control Γ, the cost of the investment choice, m, and the total costs of firing workers, $\ell_c + f$:

[27] The cost of adopting the monitoring technology m is incurred by CEO rather the firm as she is the executive in charge of pushing changes through.

$$u_{fam} = \begin{cases} \pi(e) & & & \text{if } d = D_K \text{ and } i = i_n \\ \pi(e) - (\ell_c + f) & & & \text{if } d = D_L \text{ and } i = i_n \\ \pi(e) & - m & - \Gamma & \text{if } d = D_K \text{ and } i = i_y \\ \pi(e) - (\ell_c + f) & - m & - \Gamma & \text{if } d = D_L \text{ and } i = i_y \end{cases} \tag{8}$$

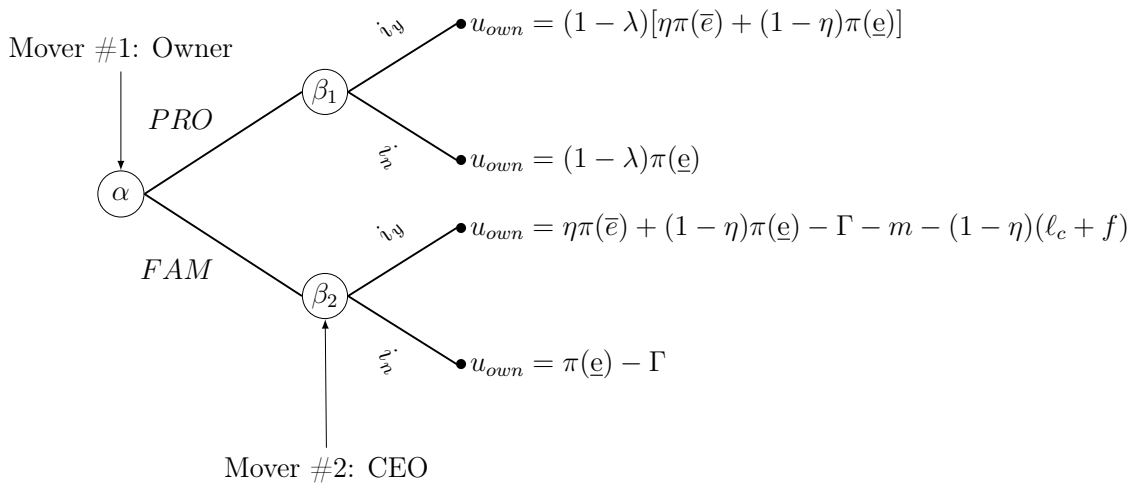
In short, the two types of CEOs face the same payoff structure, but family CEOs have a set value of $\lambda = 1$, and professional CEOs have set values of $f = 0$ and $\Gamma = 0$.

Owner The family firm owner's payoffs are the family CEO's if she chooses to manage the firm herself, $Mg = FAM$, and the share of leftover profits if she chooses $Mg = PRO$:

$$u_{own} = \begin{cases} \pi(e) & & & \text{if } Mg = FAM,\ d = D_K \text{ and } i = i_n \\ \pi(e) - (\ell_c + f) & & & \text{if } Mg = FAM,\ d = D_L \text{ and } i = i_n \\ \pi(e) & - \Gamma - m & & \text{if } Mg = FAM,\ d = D_K \text{ and } i = i_y \\ \pi(e) - (\ell_c + f) & - \Gamma - m & & \text{if } Mg = FAM,\ d = D_L \text{ and } i = i_y \\ (1 - \lambda)\pi(e) & & & \text{if } Mg = PRO \end{cases} \tag{9}$$

4.2 Equilibrium: backward induction

The model is solved by backward induction in Appendix C.2. We reproduce here the last step of the game, the owner's choice, which depends on the utility the owner would get if she acted as family CEO, versus the utility she would get from receiving the profits achieved by the professional CEO. The tree below shows the owner's payoffs at each terminal node if we substitute in the subgame perfect equilibria at each node.



The owner's decision depends on whether she would choose investment or no investment given a set of parameters, as well as her opportunity cost, which depends on the professional CEO's investment decision. There are four possible set of parameters that determine the space for four equilibria: the CEO can be a professional or a family type, and each can reach an equilibrium where they invest in monitoring and one where they do not. Each of the cases and possible equilibria are described below. There will be three threshold values that determine the parameter space based on the utility functions above, defined here to simplify notation. Given an industry ability share η, cost of hiring a professional CEO λ, cost of investing in monitoring m and $\Delta\pi = \pi(\overline{e}) - \pi(\underline{e})$, the thresholds are:

$$\text{Cost of firing for the professional CEO:} \quad \overline{L_p} = \frac{\eta\lambda\Delta\pi - m}{1-\eta}$$

$$\text{Cost of firing for the family CEO:} \quad \overline{L_f} = \frac{\eta\Delta\pi - m}{1-\eta}$$

$$\text{Net cost of control for the owner:} \quad \overline{\Gamma} = \frac{\lambda\pi(\underline{e})}{1-\eta}$$

Figure 7 visually depicts the four possible parameter regions for each equilibria, and are colour coded such that family CEO is shown in green shades and professional CEO is shown in blue shades; investment is shown in darker shades and no investment in lighter shades. The purpose of this first figure is simply to serve as a visual guide for the four cases described below, and the values $\eta = 0.5$ and $\lambda = 0.3$ are imposed here for this example. A discussion of how changing these exogenous parameters might change the sizes of the regions within the parameter space follows. The four cases are:

(a) both CEO types choose to invest in monitoring;

(b) neither CEO type chooses to invest in monitoring;

(c) only the professional CEO chooses to invest in monitoring;

(d) only the family CEO chooses to invest in monitoring.

4.3 Mechanisms: discussion and interpretation

This simple model yields four main predictions. To characterize the predictions and consider whether they are consistent with empirical evidence, we present a series of stylized facts using a combination of the World Management Survey and the matched employer-employee dataset from Brazil (RAIS). Because the focus of the model is on implicit commitments between CEOs and workers, in this section we proxy for investment in monitoring with the sub-index of the WMS measure of management that focuses on people management rather than the full management index. The people management score measures the quality of monitoring, selection and reward processes within the firm.

Prediction 1: Family CEO firms with high reputation costs will have fewer management practices.

The model assumes that family CEOs face a reputation cost (f) of firing workers owing to the relational contract within family firms. Conceptually, investing in monitoring is only useful it if the extra information garnered from the investment will be used and there can be credible commitment that it will result in firing the low effort workers. Thus, we expect to see family CEO firms with relatively higher reputation costs investing less in monitoring relative to family CEO firms with higher reputation costs.

One potential proxy for reputation cost is whether the firm is an eponymous firm — that is, whether the firm bears the founding family's name — as there is evidence that eponymy in family firms is linked to both reputation benefits and costs (Belenzon et al. 2017). Using the full WMS dataset of family firms, we show the cumulative distribution function for people management for eponymous and non-eponymous family firms in Figure 8. The CDF for non-eponymous firms stochastically dominates the distribution for eponymous firms (Kolmogorov-Smirnov test of equality has a p-value of 0.0105), suggesting eponymous firms have fewer people management practices, consistent with the model's prediction. Column (1) of table 7 shows that, for the sample of family firms in the WMS, being an eponymous firm is correlated with 0.08 standard deviations lower people management practices. Column (2) includes both proxy measures of CEO skill (awareness and college degree) and the results remain robust.

Prediction 2: Industries with higher labour power will have fewer firms with good management practices.

The industry cost of firing workers (ℓ_c) is a common determinant of whether family and professional CEOs have an incentive to invest in good management. Proxies of ℓ_c can be unionization rates within an industry, or labour laws within a country. For example, we could expect that CEOs in industries with high unionization rates would be less likely to adopt good management as they might encounter severe pushback in any firing attempts. Similarly, the process of firing workers in countries with stringent labour laws may be too costly to undertake.[28]

Empirically, we can consider the relationship between unionization rates and management practices at the firm level. The WMS collects data on the share of employees that are unionized, and we can first look at the raw relationship between unionization and firm-level people management practices in Figure 9. The lowess plot of the relationship between share of unionized workers and the firm's score in people management shows that the lower the share of unionized workers within a firm, the higher the quality of people management practices in the firm. This is the case for both family and professional CEO firms.

In column (3) of table 7, we construct an indicator for whether the firm's industry is a "high unionization" industry. We define this as an average unionization rate that is one standard deviation above the mean for all industries. Again, we see a negative and significant correlation between high industry unionization and people management for these firms. Column (4) includes both proxy measures of CEO skill (awareness and college degree) and the results remain robust. Theoretically, Figure 7 in the Appendix shows that when $\ell_c > \overline{L}$ both family and professional CEOs opt for no investment in management practices.

Prediction 3: Family CEO firms with high reputation costs in higher labour power industries will have even fewer management practices.

The model predicts an interaction effect between the common costs of firing, such as unionization rates, and reputation costs: even when there is low unionization rates, firms with high reputation costs will adopt fewer management practices. However, if family CEO firms have very low reputation costs, because of the relatively better standing of family CEO firms in higher labour power environments, they can in fact adopt at least as many management practices as non-family CEO firms. In column (5) of table 7, we interact the "high unionization" indicator and the high reputation cost (eponymy) indicator. We find, as expected that the interaction between high

[28] Another possible way to think about unionization rates would be that in a highly unionized environment there is a higher need for monitoring and "paperwork" in order to fire a worker, and thus there should be an incentive to invest in monitoring. The concept of ℓ_c here is, however, that it is more expensive generally to fire workers when there is higher union power, and even if there was a high investment in monitoring it may still be expensive to fire workers despite having documentation — so much so that it is no longer profitable to invest in monitoring.

common cost and high reputation cost is negative and significant. Column (6) includes both proxy measures of CEO skill (awareness and college degree) and the results remain robust.

To illustrate the marginal effects, we use a continuous measure of unionization — log of industry unionization — and plot the marginal effect at each level of unionization rates for eponymous and non-eponymous firms in Figure 10.

Prediction 4: Industries with higher share of low ability workers will have fewer firms with good management practices.

The industry share of high ability workers, η, is important because high ability workers shift their behaviour to high effort when monitored, yielding larger ultimate effect on profits and a lower firing costs. Figure A3 in the Appendix shows the simulated parameter space for $\eta = 0.2$ and $\eta = 0.8$, and it is clear that where $\eta = 0.8$ the space taken by the darker shades indicating $i = i_y$ is larger. Empirically, column (7) of table 7 uses the WMS measure of the share of *workers* with a college degree (this excludes managers) and find a positive and significant correlation with people management. Column (8) includes both proxy measures of CEO skill (awareness and college degree) and the results remain robust.

5 Conclusion

We set out to investigate the effect of dynastic family control on firm organization and performance, and find that family *ownership* does not fully explain family firms' underperformance, but rather it is the effect of the combination of family ownership and dynastic family control (CEO) that drives a deficit in the adoption of managerial process innovations. Given the dearth of data for private and family firms, particularly for emerging economies, we collect a rich new dataset on the history of ownership and control successions for a sample of firms in Latin America and Europe, and match it with a unique dataset on firm organizational structure and managerial practices. We go beyond the correlational findings of Bloom & Van Reenen (2007, 2010) and, using an instrumental variables approach, provide the first estimates of a causal relationship between a succession to a family CEO and fewer managerial best practices. We exploit the gender of the outgoing CEO's children as exogenous variation to identify the effect of a dynastic family CEO succession on management adoption. Our OLS and IV-2SLS results suggest that there is a statistically significant negative effect of family control, with estimates of -0.369 (OLS result) and -0.808 (IV result) standard deviations poorer management.

Relying on the body of work that has provided evidence on the strong relationship between managerial practices and firm performance, we suggest that poor management could be a reason behind family firms' poor performance. We add to the evidence on the relationship between

management practices and performance by presenting estimates focusing on family firms specifically, and the first such estimates for Brazil, an economically important middle-income country. Combining our IV results with the correlation between management and productivity, the results suggest and implied productivity decrease of 5 to 10%. This result is strikingly within the same range as the main productivity deficit results of dynastic family firms in Denmark (Bennedsen et al. 2007).

We finish by considering possible reasons why family firms adopt fewer management best practices. We first explore the often cited reason of lower levels of skill among family CEOs and, although managers in family firms are less aware of the true nature of their quality of management and tend to have lower skill levels, we show that these factors do not fully explain their gap in investment in good management practices. We then propose that the implicit employment commitments of family firms that have been previously documented in the literature may affect the incentives of family CEOs to adopt better management practices. We build a simple model to help organize the discussion of the empirical evidence on this aspect.

The model assumes family CEOs have implicit commitments to the workers of their firms, and thus incur a higher cost of firing workers relative to non-family CEOs. The model's predictions rest on three key parameters that affect the motivation for investing in a management technology: the family reputation cost f, the share of high-ability workers in an industry η, the industry cost of firing ℓ_c. This framework helps explains why we might see the distribution of management practices presented here, 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 the family CEO distribution. The key insight in this model is that we do not need to assume that family CEOs are of lower ability, but rather that they are simply responding to differential costs of investing in a type of monitoring technology (here, managerial practices) because of the unique structure of implicit commitments with their employees. We find empirical support for the predictions of the model.

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 an obvious policy goal. Process innovation such as improved managerial practices has been shown to be an important driver of aggregate productivity, but of course, 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. To the best of our knowledge, this is the first piece of work to show causal evidence of this negative effect of dynastic family control on *internal organization of the firm*. Although a naive solution could be that all family firms hire professional CEOs, that would be an unrealistic prescription. There are binding institutional constraints that bar many firm owners in emerging economies from pursuing this avenue — for example, when rule of law is wanting and the risk of expropriation is

too high to be worth appointing a professional CEO — and also owner-managers preferences for being their own boss. If we accept family control is the necessary (or preferred) control structure for many firms, it is thus 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

Abowd, J., Kramarz, F. & Margolis, D. (1999), 'High wage workers and high wage firms', *Econometrica* **67**(2), 251–333.

Alexopoulos, M. & Tombe, T. (2012), 'Management matters', *Journal of Monetary Economics* **59**(3), 269–285.

Anderson, R. & Reeb, D. (2003), 'Founding-family ownership and firm performance: Evidence from the sp 500', *The Journal of Finance* **58**(3), 1301–1328.

Angrist, J. & Pischke, J.-S. (2009), *Mostly Harmless Econometrics: an empiricist's companion*, Princeton University Press.

Bach, L. & Serrano-Velarde, N. (2015), 'Ceo identity and labour contracts: theory and evidence from ceo transitions', *Journal of Corporate Finance* **33**.

Bandiera, O., Guiso, L., Prat, A. & Sadun, R. (2012), What do ceos do?, CEP Discussion Papers dp1145, Centre for Economic Performance, LSE.

Bandiera, O., Lemos, R., Prat, A. & Sadun, R. (2017), 'Managing the family firm: evidence from ceos at work', *Review of Financial Studies* **forthcoming**. STICERD Discussion Paper.

Bassanini, A., Breda, T., Caroli, E. & Reberioux, A. (2010), Working in family firms: less paid but more secure? evidence from french matched employer-employee data, PSE Working Papers halshs-00564972, HAL.

Bassi, V. & Rasul, I. (2017), Persuasion: A case study of papal influences on fertility-related beliefs and behavior, Technical report, University College London mimeo.

Baum, C. F., Schaffer, M. E. & Stillman, S. (2002), 'Ivreg2: Stata module for extended instrumental variables/2sls and gmm estimation', Statistical Software Components, Boston College Department of Economics.

Baum, C., Schaffer, M. & Stillman, S. (2007), 'Enhanced routines for instrumental variables/gmm estimation and testing', *Stata Journal* **7**(4), 465–506.

Belenzon, S., Chatterji, A. & Daley, B. (2017), 'Eponymous entrepreneurs', *American Economic Review* **107**(6), 1638–55.

Bena, J., Fons-Rosen, C. & Hanousek, J. (2008), European pyramid ownership structures. UPF Mimeo.

Bennedsen, M., Nielsen, K., Perez-Gonzales, F. & Wolfenzon, D. (2007), 'Inside the family firm: The role of families in succession decisions and performance', *The Quarterly Journal of Economics* **122**, 647–691.

Bennett, V. M., Lawrence, M. & Sadun, R. (2015), Are founder ceos good managers?, Conference volume chapter, NBER.

Bertrand, M., Johnson, S., Samphantharak, K. & Schoar, A. (2008), 'Mixing family with business: A study of thai business groups and the families behind them', *Journal of Financial Economics* **88**, 466.

Bertrand, M. & Schoar, A. (2003), 'Managing with style: the effect of managers on firm policies', *The Quarterly Journal of Economics* **118**, 1169–1208.

Bertrand, M. & Schoar, A. (2006), 'The role of family in family firms', *Journal of Economic Perspectives* **20**(2), 73–96.

Black, S. E. & Lynch, L. M. (2001), 'How to compete: the impact of workplace practices and information technology on productivity', *The Review of Economics and Statistics* **83**, 434–445.

Bloom, N., Eifert, B., Mahajan, A., McKenzie, D. & Roberts, J. (2013), 'Does management matter? evidence from india', *The Quarterly Journal of Economics* **128**, 1–51.

Bloom, N., Genakos, C., Sadun, R. & Van Reenen, J. (2012), 'Management practices across firms and countries', *The Academy of Management Perspectives* **26**, 12–33.

Bloom, N., Lemos, R., Sadun, R. & Reenen, J. V. (2015), 'Does management matter in schools?', *The Economic Journal* **125**, 647–674.

Bloom, N., Lemos, R., Sadun, R., Scur, D. & Van Reenen, J. (2014), 'The new empirical economics of management', *Journal of the European Economic Association* **12**(4).

Bloom, N., Sadun, R. & Van Reenen, J. (2015), Management as a technology? Mimeo.

Bloom, N. & Van Reenen, J. (2007), 'Measuring and explaining management practices across firms and countries', *The Quarterly Journal of Economics* **122**, 1351–1408.

Bloom, N. & Van Reenen, J. (2010), 'Why do management practices differ across firms and countries?', *Journal of Economic Perspectives* **24**, 203–224.

Burkart, M. & Panunzi, F. (2006), 'Agency conflicts, ownership concentration, and legal shareholder protection', *Journal of Financial Intermediation* **15**, 1–31.

Cai, H., Li, H., Park, A. & Zhou, L.-A. (2013), 'Family ties and organizational design: evidence from chinese private firms', *Review of Economics and Statistics* **95**(3), 850–867.

Caselli, F. & Gennaioli, N. (2013), 'Dynastic management', *Economic Inquiry* **51**(1), 971–996.

Claessens, S. & Djankov, S. (1999), 'Ownership concentration and corporate performance in the czech republic', *Journal of Comparative Economics* **27**, 498–513.

Claessens, S., Djankov, S., Fan, J. & Lang, L. (2002), 'Disentangling the incentive and entrenchment effects of large shareholdings', *Journal of Finance* **57**(6), 2741–2771.

Claessens, S., Djankov, S. & Lang, L. (2000), 'The separation of ownership and control in east asian corporations', *Journal of Financial Economics* **58**(1-2), 81–112.

Demsetz, H. & Villalonga, B. (2001), 'Ownership structure and corporate performance', *Journal of Corporate Finance* **7**, 209–233.

Ellul, A., Pagano, M. & Schivardi, F. (2014), Employment and wage insurance within firms: Worldwide evidence, Technical Report 369, CSEF Working Papers.

Faccio, M. & Lang, L. (2002), 'The ultimate ownership of western european corporations', *Journal of Financial Economics* **65**(3), 365–395.

Fons-Rosen, C., Bena, J. & Ondko, P. (2008), Zephyr: Ownership changes database, Mimeo, London School of Economics. LSE Mimeo.

Gibbons, R. & Roberts, J. (2013), *The Handbook of Organizational Economics*, Princeton University Press.

Giorcelli, M. (2016), The effects of management and technology transfer: Evidence from the marshall plan productivity program. Job Market Paper, Stanford University mimeo.

Iacovone, L., Maloney, W. & Tsivanidis, N. (2015), Family firms and contractual institutions. Mimeo.

Ichniowski, C., Shaw, K. & Prennushi, G. (1997), 'The effects of human resource management practices on productivity: A study of steel finishing lines', *The American Economic Review* **87**, 291–313.

Kaplan, S. & Sorensen, M. (2017), Are ceos different? characteristics of top managers, NBER Working Papers 23832, National Bureau of Economic Research, 1050 Massachussets Avenue, Cambridge MA 02138.

Khanna, T. & Palepu, K. (2000), 'Is group affiliation profitable in emerging markets? an analysis of diversified indian business groups', *Journal of Finance* **55**(2), 867–891.

Kleibergen, F. (2002), 'Pivotal statistics for testing structural parameters in instrumental variables regression', *Econometrica* **70**(5), 1781–1803.

Kleibergen, F. & Paap, R. (2006), 'Generalized reduced rank test using the singular value decomposition', *Journal of Econometrics* **133**(1), 97–126.

La Porta, R., de Silanes, F. L. & Shleifer, A. (1999), 'Corporate ownership around the world', *The Journal of Finance* **54**, 471–517.

La Porta, R., de Silanes, F. L., Shleifer, A. & Vishny, R. (1997), 'Legal determinants of external finance', *The Journal of Finance* **52**, 1131–1150.

Levinsohn, J. & Petrin, A. (2003), 'Estimating production functions using inputs to control for unobservables', *The Review of Economic Studies* **70**(2), 317–341.

Miller, D., Breton-Miller, I. L., Lester, R. & Jr, A. C. (2007), 'Are family firms really superior performers?', *Journal of Corporate Finance* **13**, 289–858.

Morck, R., Shleifer, A. & Vishny, R. (1988), 'Management ownership and market valuation: an empirical analysis', *Journal of Financial Economics* **20**, 293–315.

Morck, R., Strangeland, D. & Yeung, B. (2000), *Concentrated Corporate Ownership*, Chicago University Press, Chicago, nber conference volume Inherited Wealth, Corporate Control and Economic Growth?

Morck, R., Wolfenzon, D. & Yeung, B. (2005), 'Corporate governance, economic entrenchment and growth', *Journal of Economic Literature* **43**, 655–720.

Mueler, H. & Philippon, T. (2011), 'Family firms and labor relations', *American Economic Journal: Macroeconomics* **3**(2), 218–245.

Perez-Gonzales, F. (2006), 'Inherited control and firm performance', *American Economic Review* **96**(5).

Rivkin, J. (2000), 'Imitation of complex strategies', *Science* **46**, 824–844.

Sraer, D. & Thesmar, D. (2007), 'Performance and behavior of family firms: evidence from the french stock market', *Journal of the European Economic Association* **5**(4), 709–751.

Stock, J. & Yogo, M. (2005), *Identification and Inference for Econometric Models: Essays in Honor of Thomas J Rothenberg*, Cambridge University Press, New York, chapter Testing for Weak Instruments in Linear IV Regression.

Villalonga, B. & Amit, R. (2006), 'How do family ownership, control and management affect firm value?', *Journal of Financial Economics* **80**, 385–417.

World Management Survey team (n.d.), 'Management matters - presentation'.

Tables

Table 1: Management and firm performance in dynastic family firms: descriptive evidence using public accounts data (Orbis)

	(1) ln(sales)	(2) ln(sales)	(3) ln(sales)	(4) ln(sales)	(5) ln(sales)	(6) ln(sales)	(7) ln(sales)
Ownership and control categories							
Private firms (reference category)							
Dynastic family CEO	-0.365***	-0.113***	-0.080**	-0.038	-0.036		
	(0.060)	(0.034)	(0.033)	(0.034)	(0.034)		
Management variables							
z-management				0.057***	0.063***	0.087***	0.052***
				(0.014)	(0.017)	(0.031)	(0.017)
z-management x Dynastic family CEO					-0.005		
					(0.029)		
Firm controls		✓	✓	✓	✓	✓	✓
Industry FE			✓	✓	✓	✓	✓
Survey noise controls				✓	✓	✓	✓
Observations	6125	6125	6125	6125	6125	895	4465
R^2	0.275	0.754	0.776	0.780	0.780	0.799	0.782
Sample:	**All WMS firms**	**All WMS firms**	**All WMS firms**	**All WMS firms**	**All WMS firms**	**Family WMS firms**	**Non-family WMS firms**

* 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 Dyjk (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.

Table 2: Management and firm performance in dynastic family firms: descriptive evidence using Brazilian Industrial Census data

	Model: OLS				**Model: Levinsohn-Petrin**			
	(1) ln(va)	(2) ln(va)	(3) ln(sales)	(4) ln(sales)	(5) ln(va)	(6) ln(va)	(7) ln(sales)	(8) ln(sales)
z-management	0.115***	0.179***	0.050***	0.090***	0.129***	0.194***	0.057***	0.080***
	(0.029)	(0.031)	(0.011)	(0.018)	(0.038)	(0.038)	(0.01)	(0.013)
Firm controls	✓	✓	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓
# Observations	213	290	213	291	3000	3595	3269	3963
# Firms	213	290	213	291	213	290	213	291
Sample	**Family**	**Non-family**	**Family**	**Non-family**	**Famiy**	**Non-family**	**Family**	**Non-family**

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

Note: Each column of regressions is estimated by either OLS or by the Levinsohn & 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.

Table 3: Difference in means: family vs. non-family succession

	Family Mean	**Non-family Mean**	**Diff in means**	**T Stat**	**Family N**	**Non-family N**
Family characteristics						
Of founder CEO						
First child = male	0.80	0.65	-0.14**	-3.20	680	133
Had at least one son	0.95	0.81	-0.14***	-4.09	689	135
# children	3.10	2.45	-0.64***	-4.61	689	135
# children | first = boy	3.09	2.75	-0.35	-1.95	541	87
# boys	1.98	1.50	-0.47***	-4.48	689	135
Firm characteristics, regressors						
Employment	462.80	544.84	82.03	1.08	689	135
Firm age	50.52	46.35	-4.17	-1.48	689	135
% of employees with degrees	11.35	14.44	3.09*	2.32	689	135
MNE = 1	0.12	0.52	0.39***	8.75	688	135
Share in low tech industries	0.47	0.30	-0.16***	-3.68	689	135
Levels between CEO and shopfloor	3.25	3.57	0.33**	3.03	677	133
# direct reports to plant manager	7.17	7.75	0.59	1.16	685	134
Avg hrs/wk, manager	48.82	48.10	-0.72	-1.33	686	135
Avg hrs/wk, non-manager	43.58	42.81	-0.77*	-2.09	685	135
# production sites, total	2.24	3.54	1.31	1.61	689	134
# production sites, abroad	0.37	1.73	1.36	1.73	689	134

Table 4: Ownership and control structures on quality of management: regressions using full WMS sample and sample used in the IV analysis

	(1) z-management	(2) z-management	(3) z-management	(4) z-management	(5) z-management	(6) z-management
Dispersed Shareholders (reference category)						
Family run firms						
Dynastic family CEO	-0.724***	-0.612***	-0.289***	-0.293***	-0.287***	-0.369***
	(0.025)	(0.025)	(0.024)	(0.033)	(0.034)	(0.111)
Founder (1st generation) CEO	-0.961***	-0.796***	-0.320***	-0.353***		
	(0.024)	(0.025)	(0.025)	(0.037)		
Non-family run firms						
Family owned, professional CEO	-0.314***	-0.228***	-0.097**	-0.080	-0.084	-0.207
	(0.047)	(0.045)	(0.040)	(0.053)	(0.054)	(0.144)
Privately owned, professional CEO	-0.437***	-0.368***	-0.155***	-0.145***	-0.137***	-0.253
	(0.024)	(0.023)	(0.021)	(0.030)	(0.030)	(0.162)
Observations	13842	13842	13842	6793	5468	818
R^2	0.129	0.188	0.384	0.338	0.323	0.240
Noise controls			✓	✓	✓	✓
Firm & country controls			✓	✓	✓	✓
Industry controls		✓	✓	✓	✓	✓
Sample used:	**Full WMS**	**Full WMS**	**Full WMS**	**IV countries**	**IV countries**	**IV firms only**
Tests of equality (p-values)						
Family run firms	0.000	0.000	0.185	0.055		
Non-family run firms	0.009	0.002	0.143	0.205	0.310	0.774
Family vs non-family runs firms	0.000	0.000	0.000	0.000	0.000	0.131

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

Note: All columns estimated by OLS with standard errors clustered by firm. All data comes from the World Management Survey. z-management is the plant-level standardized management score. General controls include firm-level controls for average hours worked and the proportion of employees with college degrees (from the survey), 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. The base category here is firms with dispersed shareholder ownership.

Table 5: IV-2SLS results for the effect of family control on firm managerial structures

	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	-0.369***		-0.808**	-0.767**	-0.423	-0.747*	-0.686*	-0.673*
	(0.111)		(0.388)	(0.382)	(0.560)	(0.412)	(0.381)	(0.375)
Had at least 1 son		-0.298**						
		(0.123)						
# Firms			810	806	800	810	810	810
K-P Wald F-statistic			21.58	7.599	11.37	21.58	21.58	21.58
Hansen's J statistic				0.553				
Hansen's J p-value				0.758				
Stock-Yogo 10% Critical Value			*16.38*	*16.38*	*16.38*	*16.38*	*16.38*	*16.38*
Stock-Yogo 15% Critical Value			*8.96*	*8.96*	*8.96*	*8.96*	*8.96*	*8.96*
Stock-Yogo 20% Critical Value			*6.66*	*6.66*	*6.66*	*6.66*	*6.66*	*6.66*
			IV First Stage results					
Excluded instruments								
Had at least 1 son			0.308***			0.308***	0.308***	0.308***
			(0.066)			(0.066)	(0.066)	(0.066)
1 son				0.304***				
				(0.068)				
2 sons				0.302***				
				(0.069)				
3+ sons				0.348***				
				(0.074)				
First child = male					0.124***			
					(0.037)			
Control for family size: linear	✓	✓	✓	✓	✗	✓	✓	✓
# Observations	818	818	818	814	807	818	818	818
# Firms	810	810	810	806	800	810	810	810
R^2	0.311	0.259	0.059	0.064	0.019	0.059	0.059	0.059

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

Note: Columns (1) and (2) estimated by OLS with standard errors clustered by firm. Columns (3) through (6) 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.

Table 6: Mechanisms: what explains the gap in management performance between family and non-family firms

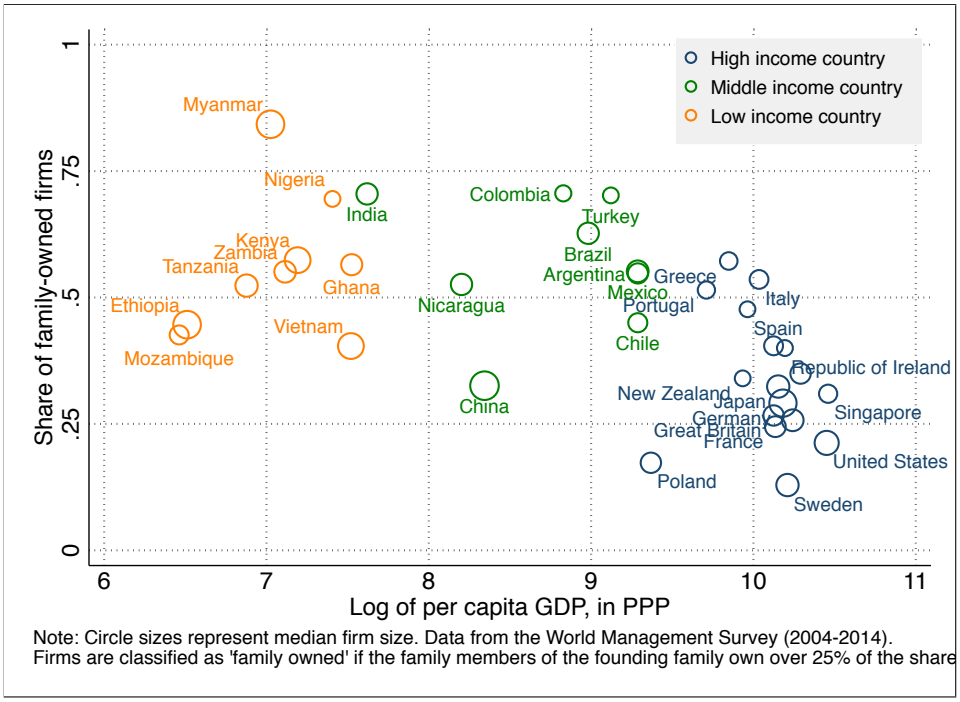
	(1) z-mgmt	(2) z-mgmt	(3) z-mgmt	(4) z-mgmt	(5) z-mgmt
Reference category: private firms					
Dynastic family CEO = 1	-0.130***	-0.130***	-0.125***	-0.127***	-0.122***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Family owned, professional CEO = 1	-0.000	-0.000	-0.001	0.005	0.004
	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)
Awareness measure					
Awareness			0.146***		0.149***
			(0.008)		(0.008)
Skills measure					
Degree = 1				0.202***	0.208***
				(0.012)	(0.012)
Observations	14462	14462	14462	14462	14462
R^2	0.355	0.355	0.375	0.368	0.388
Noise controls	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓	✓
Industry controls	✓	✓	✓	✓	✓

Table 7: Mechanisms: model predictions

	Prediction 1		**Prediction 2**		**Prediction 3**		**Prediction 4**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	z-people	z-people	z-people	z-people	zpeople	z-people	z-people	z-people
Eponymous firm=1	-0.081**	-0.077**			-0.091**	-0.084**		
	(0.040)	(0.039)			(0.042)	(0.041)		
High unionized industry=1			-0.069**	-0.063*	-0.015	0.007		
			(0.033)	(0.032)	(0.070)	(0.070)		
Eponymous firm=1 ×					-0.299*	-0.285*		
High unionized industry=1					(0.166)	(0.164)		
Ln(share skilled workers)							0.134***	0.125***
							(0.006)	(0.007)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓			✓	✓
Control for manager skill		✓		✓		✓		✓
Observations	3545	3509	13811	13096	3668	3628	12579	12495
# Firms	2784	2762	10452	10092	2858	2833	9792	9733
R^2	0.290	0.295	0.268	0.279	0.0850	0.103	0.304	0.316
Sample:	**WMS**	**WMS**	**WMS**	**WMS**	**WMS**	**WMS**	**WMS**	**WMS**
	Family firms	**Family firms**	**All firms**	**All firms**	**Family firms**	**Family firms**	**All firms**	**All firms**

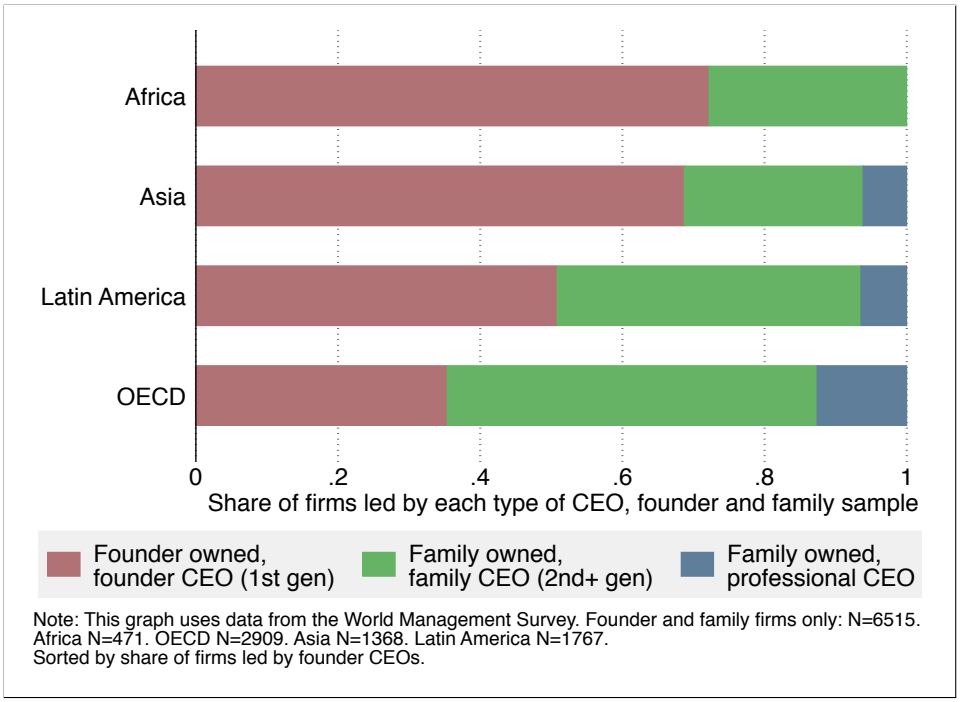
Figures

Figure 1: Share of family or founder firms across the world, manufacturing



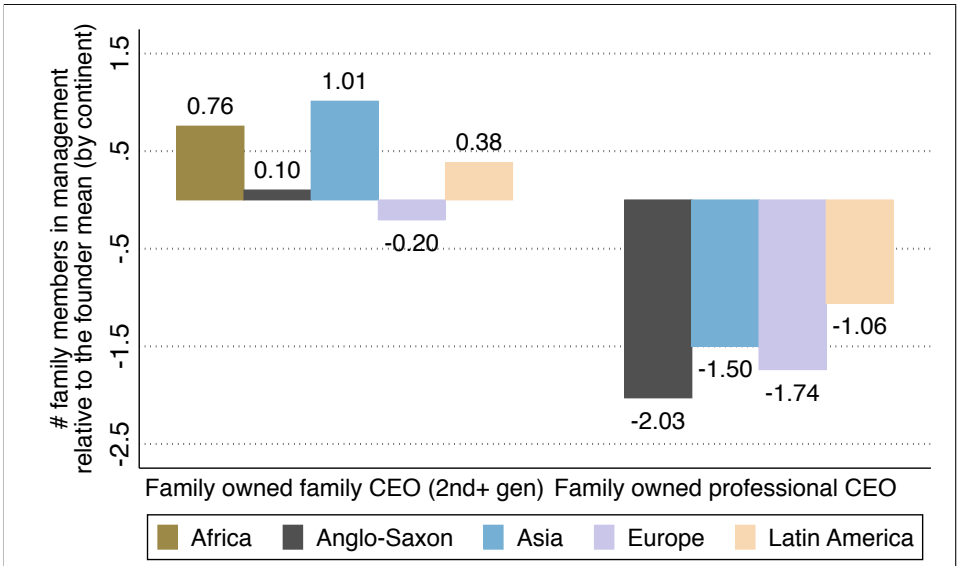
Note: Circle sizes represent median firm size. Data from the World Management Survey (2004-2014).
Firms are classified as 'family owned' if the family members of the founding family own over 25% of the share

Figure 2: Share of CEO type leading family or founder firms



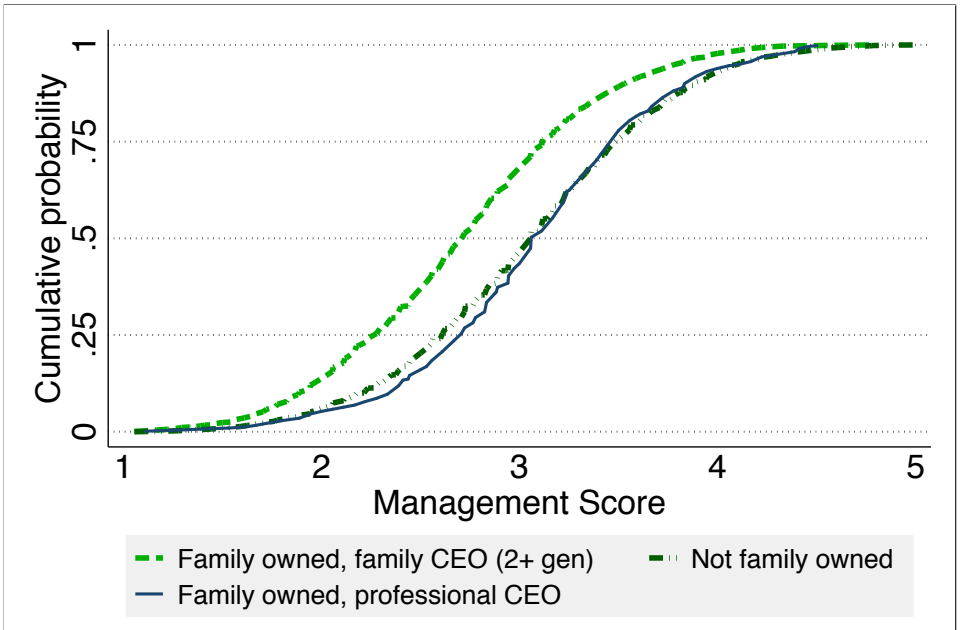
Note: This graph uses data from the World Management Survey. Founder and family firms only: N=6515.
Africa N=471. OECD N=2909. Asia N=1368. Latin America N=1767.
Sorted by share of firms led by founder CEOs.

Figure 3: Number of family members involved in management of family firms, relative to the founder mean (by continent)



Note: This graph uses data from the Ownership Survey. Each column represents the average number of family members involved in management in family-owned firms in each continent, relative to the continental average of family members involved in management in founder-owned firms. Founder/family firms only.
Total N=3099. Africa N=556. Anglo-Saxon N=289. Asia N=293. Europe N=659. Latin America N=1302.

Figure 4: Quality of management practices, by type of ownership



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

Figure 5: Successions from founder or family control, by number of sons of the outgoing CEO

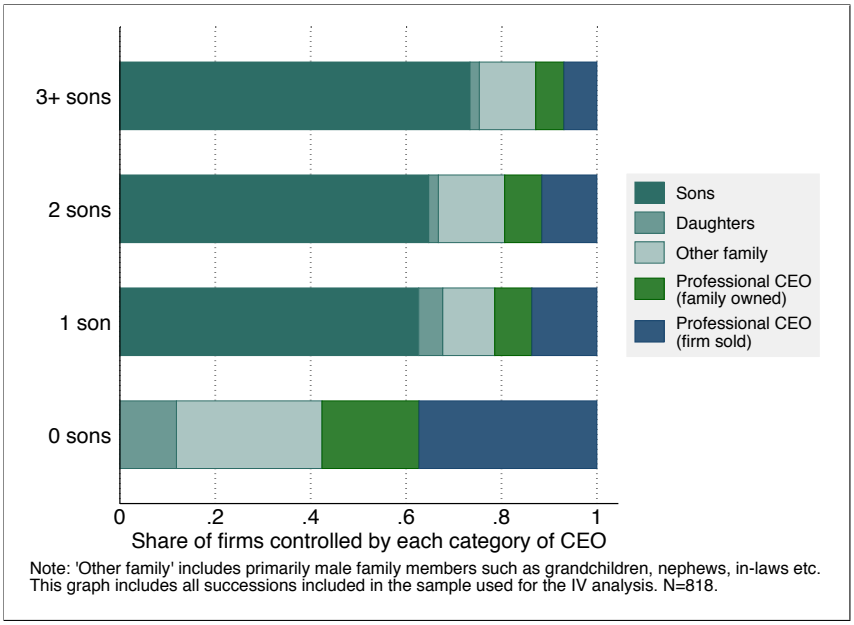


Figure 6: Distribution of family size (number of children) conditional on gender of the first child

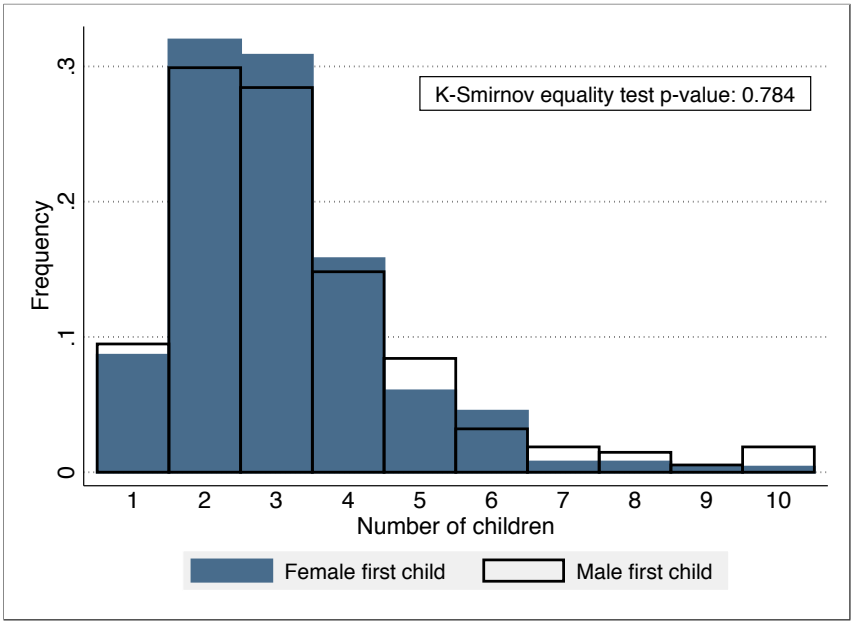


Figure 7: Parameters determining the four equilibria space, for $\eta = .5$

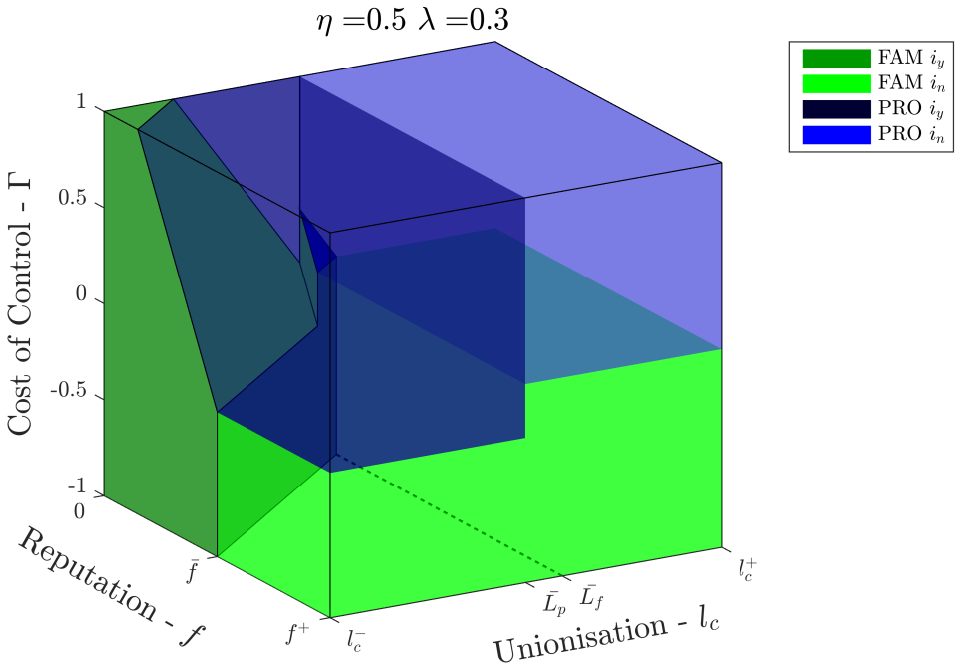


Figure 8: Prediction 1: firms with higher reputation costs (f) vs management

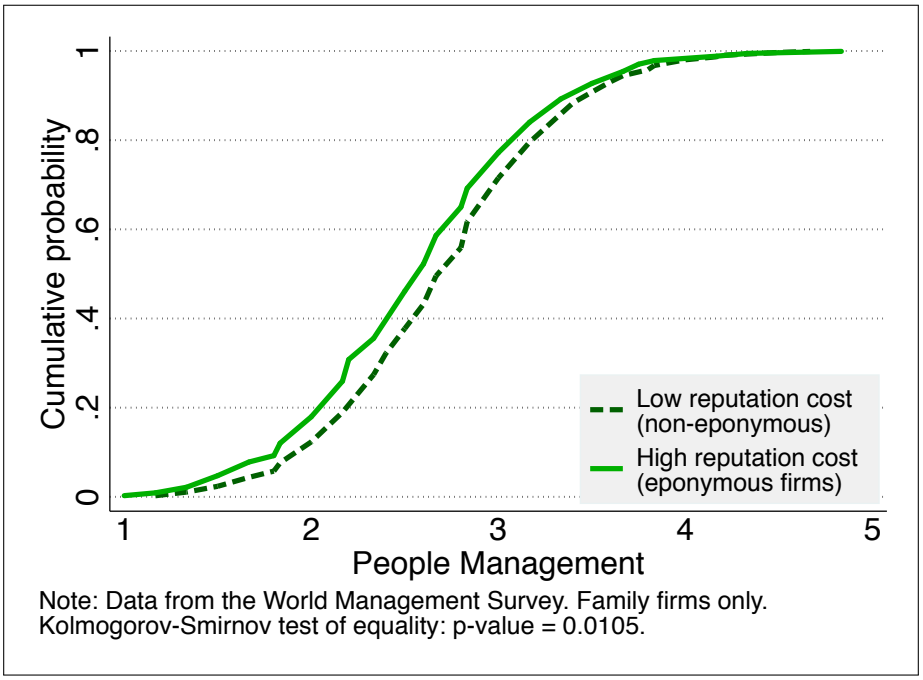


Figure 9: Prediction 2: common firing costs ℓ_c and investment in management

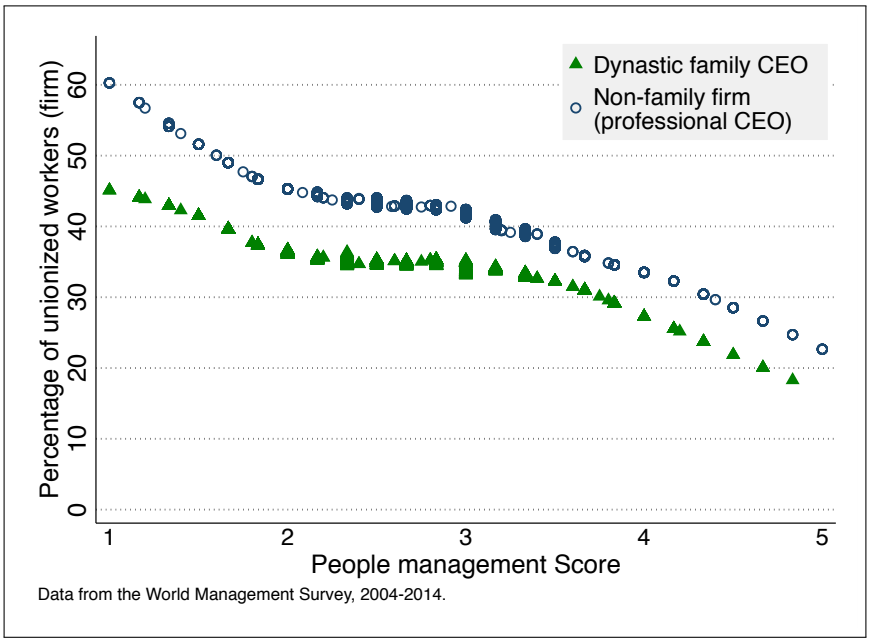
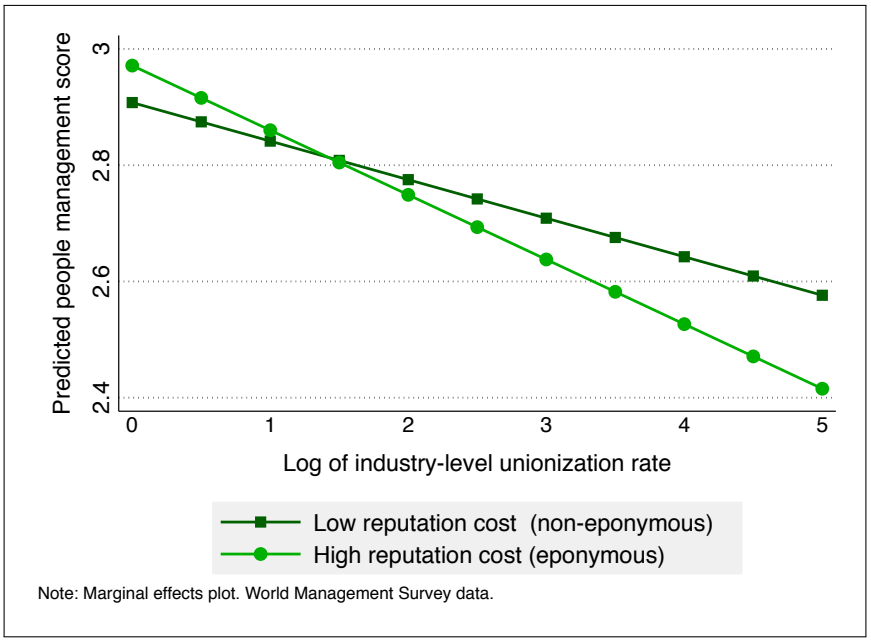


Figure 10: Prediction 3: investment in management and the interaction of common firing costs ℓ_c and reputation costs f



Appendices

A Data

A.1 Ownership categories and additional summary statistics

The variables we are collecting include a 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, we ask whether the founder had children. If yes, then we ask for the gender of the first child, how many children the founder-CEO had in total and the gender of all the children. For each succession we also ask who the control was transferred to, in terms of family relationship. With this information we can ascertain whether the founder had children at all, whether the first child was male, the ratio of male to female children, and who control of the firm was passed on to within the family.

Our survey is specifically concerned with *controlling shares of ownership*, similar to how Bureau van Dijk's datasets are compiled. Thus, by more than 25% of the controlling shares we mean more than 25% of the "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.

Table A1 describes the definition of ownership and control structures used in this paper. We differentiate between *combined* ownership and control, which we refer to generally as "family firms" (for ease of exposition) and *separate* ownership and control "non-family firms." Table A4 shows the summary statistics of the dataset we use in our main analysis.

A.2 Robustness checks

We have carried out a series of robustness checks of our main results. Table A6 reports the results for our specifications from Table 5 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:

$$FamilyCEO_i = \alpha_{fs} + \sum_{j=2}^{3} \rho_j SON_j + \vartheta_1 SON_1 + \vartheta_2 children_i + \boldsymbol{\eta'} \boldsymbol{X_i} + \nu_i \quad (10)$$

$$FamilyCEO_i = \alpha_{fs} + \sum_{j=1}^{3} \rho_j SON_j + \sum_{j=1}^{3} \vartheta_j children_j + \boldsymbol{\eta'} \boldsymbol{X_i} + \nu_i \quad (11)$$

In Column (7), we attempt to address the possible 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 pulling it out of the IV set and adding it to the set of controls. Given that the second stage results are not statistically different, this serves as evidence that 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 - that is, including number of children dummies instead of the single variable. 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.

A.3 Family firms and wages: evidence from Brazil

We matched 613 firms from the Brazilian WMS sample (over 70%) and use RAIS data from 2008, matching the survey year of the majority of the matched firms. We merged in the governance structure information to consider the relationship between ownership structure and wages. Similar to evidence from France (Bach & Serrano-Velarde 2015, Bassanini et al. 2010) and Italy (Ellul et al. 2014), we find that family firms in Brazil pay lower wages. Table A7 reports the correlation between each type of governance structure and log of monthly wages relative to Dispersed Shareholder firms for Brazilian firms. Column (1) includes industry and basic firm controls (firm size, firm age and MNE status) and industry fixed effects and suggests that dynastic firms pay 34% lower wages relative to dispersed shareholder firms. Including worker characteristics (race, education, occupation) in Column (2) reduces the coefficient to -0.236. Column (3) includes the worker "person effect" estimated using an AKM model (Abowd et al. 1999) which proxies for individual worker ability.[29] The coefficients suggest that dynastic family firms pay wages that are 13% lower relative to other non-family firms. Other non-family firms — private firms and family firms with professional CEOs — pay wages that are not statistically different from those of dispersed shareholder firms.

A.4 Management across regions and industries

One important consideration is to what extent we should be treating this relationship between family control and management practices as something that is common across countries. It could be that family ownership and control matters more in countries where there is less competition, better rule of law, or a different mix of industries. To consider

[29]The Abowd et al. (1999) AKM person effect was estimated in a separate project, with Ian Schmutte and Chris Cornwell.

this, we broke the full WMS sample into the continental regions and report the results in Table A8. The coefficients across nearly all regional specifications are not statistically different from each other, with the exception of Africa. This suggests that across the world, being owned and controlled by a founder or founding family is associated with a similar negative effect on firm management.

Finally, another interesting feature to consider in terms of firm characteristics is the industrial mix in each group of firms. Figure A4 shows the relationship between management and the share of family firms within each 2-digit industrial sector. Each observation is an industrial sector and it is colour coded to indicate high (red) and low (hollow blue) tech industries. High tech industries are overwhelmingly both better managed and have lower shares of family firms. This result echoes one of the findings in Bennedsen et al. (2007), where they suggest that the negative effect of family CEOs are worse for firms in higher tech industries. To take this into account we ensure we add industry fixed effects to all our specifications, and this is an avenue of research that could be explored in the future with more detailed administrative datasets.

A.5 Appendix A Tables and Figures

Table A1: Data categories - The Ownership Survey

Ownership category	**Ownership & control**	
	Non-family	Family
Founder or family owned		
Founder owned, founder CEO		✓
Founder owned, professional CEO	✓	
Family owned, family CEO		✓
Family owned, professional CEO	✓	
Privately owned (non-founding family owners)*		
Single owner, owner CEO		✓
Single owner, professional CEO	✓	
Many owners, owner CEO		✓
Many owners, professional CEO	✓	
*Dispersed shareholders***	✓	

** For the category of Privately owned, at least one entity owns more than 25% of voting shares, and they are not members of the founding family.*
*** For the category of Dispersed shareholders, no one entity owns more than 25% of voting shares.*

Table A2: Ownership survey: CEO type by ownership category

Ownership:	**Family owned**	**Founder owned**	**Private Individuals**	**Dispersed Shareholders**	**Government**	**Total**
Share of total	29%	27%	27%	16%	1%	100%
N	784	721	736	439	30	2710
CEO control:						
1st son	14.9%	44.4%	.	.	.	
Daughters	0.6%	3.5%	.	.	.	
Founder	64.4%	10.7%	.	.	.	
In laws	0.5%	0.7%	.	.	.	
Other family	4.1%	21.6%	.	.	.	
Other sons	4.5%	6.7%	.	.	.	
Professional	11.0%	12.5%	100%	100%	100%	

Table A3: Sample of firms: country level

Country	**2013/14 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%
Portugal	101	99	98%	74	37	50.0%
Turkey	332	163	49%	83	79	95.2%
Europe total	**1485**	**1094**	**74%**	**920**	**334**	**36.3%**
Total	**4039**	**2710**	**67%**	**1711**	**810**	**47.3%**

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.

Table A4: Summary statistics, only IV sample firms

	Family CEO				Non-family CEO			
	Mean	Median	SD	N	Mean	Median	SD	N
Family characteristics								
Of previous CEO								
First child = male	0.80	1.0	(0.40)	680	0.65	1.0	(0.48)	133
Had at least one son	0.95	1.0	(0.22)	689	0.81	1.0	(0.40)	135
# children	3.10	3.0	(1.60)	689	2.45	2.0	(1.46)	135
# children | first = boy	3.09	3.0	(1.60)	541	2.75	2.0	(1.53)	87
# boys	1.98	2.0	(1.12)	689	1.50	1.0	(1.12)	135
Of current firm								
# family members working in firm	2.04	2.0	(6.74)	689				
Son	0.09	0.0	(0.28)	689				
Brother	0.16	0.0	(0.36)	689				
Total %: male family members	0.29	0.0	(0.45)	689				
Daughter	0.04	0.0	(0.20)	689				
Sister	0.08	0.0	(0.26)	689				
Total %: female family members	0.17	0.0	(0.37)	689				
Firm characteristics								
Employment	462.80	230.0	(701.70)	689	544.84	250.0	(822.46)	135
Firm age	50.52	47.0	(28.61)	689	46.35	41.0	(30.18)	135
MNE = 1	0.12	0.0	(0.33)	688	0.52	1.0	(0.50)	135
Share in low tech industries	0.47	0.0	(0.50)	689	0.30	0.0	(0.46)	135
% of employees with degrees	11.35	7.8	(12.77)	689	14.44	10.2	(14.41)	135
Management scores								
Management (overall)	2.68	2.7	(0.57)	689	2.90	2.9	(0.57)	135
Management: ops & monitoring	2.86	2.9	(0.72)	689	3.16	3.1	(0.70)	135
Management: targets	2.58	2.6	(0.68)	689	2.84	2.8	(0.68)	135
Management: people	2.55	2.5	(0.52)	689	2.63	2.7	(0.57)	135

Table A5: Management and firm performance in family firms

	(1) ln(sales)	(2) ln(sales)	(3) ln(sales)	(4) ln(sales)	(5) ln(sales)	(6) ln(sales)	(7) ln(sales)
Ownership and control categories							
Private firms (reference category)							
Dynastic family CEO	-0.365***	-0.113***	-0.080**	-0.038	-0.036		
	(0.060)	(0.034)	(0.033)	(0.034)	(0.034)		
Founder (1st gen) CEO	-0.593***	-0.079**	-0.055	-0.013	-0.020		
	(0.060)	(0.037)	(0.036)	(0.037)	(0.038)		
Family owned, professional CEO	-0.028	-0.004	0.014	0.024	0.014		
	(0.096)	(0.061)	(0.058)	(0.057)	(0.059)		
Management variables							
z-management				0.057***	0.063***	0.087***	0.052***
				(0.014)	(0.017)	(0.031)	(0.017)
z-management x Dynastic family CEO					-0.005		
					(0.029)		
z-management x Founder (1st gen) CEO					-0.051		
					(0.034)		
z-management x Family owned, professional CEO					0.044		
					(0.056)		
Firm controls		✓	✓	✓	✓	✓	✓
Industry FE			✓	✓	✓	✓	✓
Survey noise controls				✓	✓	✓	✓
Observations	6125	6125	6125	6125	6125	895	4465
R^2	0.275	0.754	0.776	0.780	0.780	0.799	0.782
Sample:	**All WMS firms**	**All WMS firms**	**All WMS firms**	**All WMS firms**	**All WMS firms**	**Family WMS firms**	**Non-family WMS firms**

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

Note: Regressions estimated by OLS. Standard errors clustered by firm. Sales data from Orbis Bureau van Dyjk. 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 management score. 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.

Table A6: 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	-1.049**	-1.014**	-0.384	-1.020**	-0.962**	-0.415	-0.718*	-0.606
	(0.509)	(0.503)	(0.529)	(0.490)	(0.476)	(0.548)	(0.390)	(0.428)
Hansen's J statistic		2.167			2.535		0.219	1.214
Hansen's J p-value		0.338			0.281		0.640	0.545
					IV First Stage results			
Excluded instruments								
Had at least 1 son	0.280***			0.280***				
	(0.075)			(0.074)				
First child = male			0.132***			0.126***		
			(0.042)			(0.041)		
1 son		0.277***			0.274***		0.304***	0.293***
		(0.078)			(0.077)		(0.068)	(0.079)
2 sons		0.275***			0.278***		0.302***	0.293***
		(0.078)			(0.077)		(0.069)	(0.081)
3+ sons		0.307***			0.312***		0.348***	0.334***
		(0.084)			(0.083)		(0.074)	(0.085)
1 child								0.080
								(0.120)
2 children								0.046
								(0.116)
3+ children								0.110
								(0.118)
Control for family size: linear	✓	✓		✓	✓		✓	
# Observations	818	814	807	818	814	807	814	814
# Firms	810	806	800	810	806	800	806	806
R^2	0.047	0.050	0.022	0.048	0.051	0.020	0.064	0.066
F-stat (first stage)	7.745	5.098	6.218	8.013	5.347	5.725	7.374	5.807

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

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.

Table A7: Family firms and wages

	(1) ln(monthly wage)	(2) ln(monthly wage)	(3) ln(monthly wage)
Family run firms			
Family owned, family CEO	-0.335***	-0.236***	-0.133***
	(0.086)	(0.061)	(0.047)
Founder owned, founder CEO	-0.304***	-0.223***	-0.129***
	(0.084)	(0.060)	(0.047)
Non-family run firms			
Family owned, professional CEO	-0.122	-0.101	-0.073
	(0.140)	(0.102)	(0.070)
Privately owned, professional CEO	-0.110	-0.064	-0.016
	(0.086)	(0.056)	(0.043)
Dispersed Shareholders (reference category)			
Observations	183,898	183,898	183,838
# Firms	613	613	613
R^2	0.337	0.576	0.786
Firm controls	✓	✓	✓
Industry controls	✓	✓	✓
Worker characteristics	✓	✓	✓
Sample used:	**WMS-RAIS (BR)**	**WMS-RAIS (BR)**	**WMS-RAIS (BR)**
Tests of equality			
Family (controlled) firm	0.488	0.725	0.896
Non-family (controlled)	0.925	0.705	0.383
Family vs non-family (controlled)	0.000	0.001	0.002

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

Note: All columns estimated by OLS with standard errors clustered by firm. All data comes from the World Management Survey. z-management is the plant-level standardized management score. General controls include firm-level controls for average hours worked and the proportion of employees with college degrees (from the survey), 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. The base category here is firms with dispersed shareholder ownership.

Table A8: Management and family ownership and control across regions, WMS

	Anglo-Saxon	Sca' via & W. Europe	S & C Europe	Latin America	Asia	Africa
Family Control = 1	-0.166***	-0.149***	-0.162***	-0.211***	-0.168***	-0.122***
	(0.024)	(0.032)	(0.030)	(0.021)	(0.029)	(0.034)
Ln(employment)	0.123***	0.153***	0.178***	0.221***	0.129***	0.134***
	(0.008)	(0.012)	(0.017)	(0.010)	(0.010)	(0.016)
Observations	4299	2438	1904	3049	2453	867
Noise controls	✓	✓	✓	✓	✓	✓
Industry controls	✓	✓	✓	✓	✓	✓
Firm controls	✓	✓	✓	✓	✓	✓

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

Note: All columns estimated by OLS with standard errors clustered by firm and reported in brackets below the estimates. Sample includes all firms with controls data. Management is the plant-level management score. Controls include a full set of country dummies, US-SIC dummies and year dummies, as well as firm-level controls including the proportion of employees with college degrees (from the survey), interviewer dummies, the seniority and tenure of the manager who responded, the day of the week the interview was conducted, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer.

Figure A1: Average number of family members involved in the management of family or founder firms, by global region

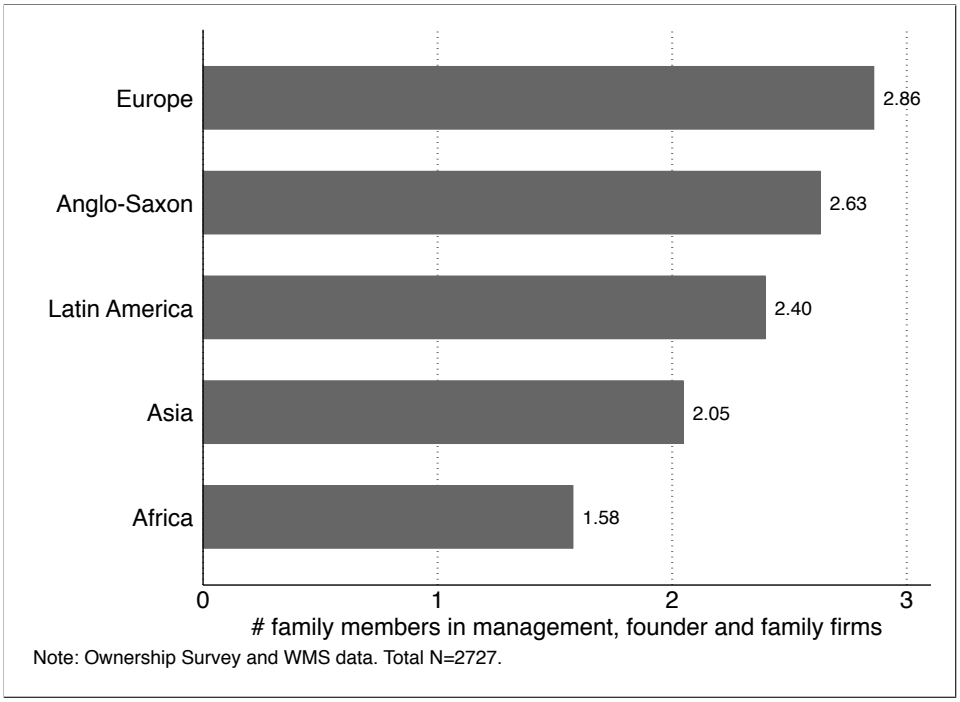


Figure A2: Brazilian firms: value added, by type of ownership

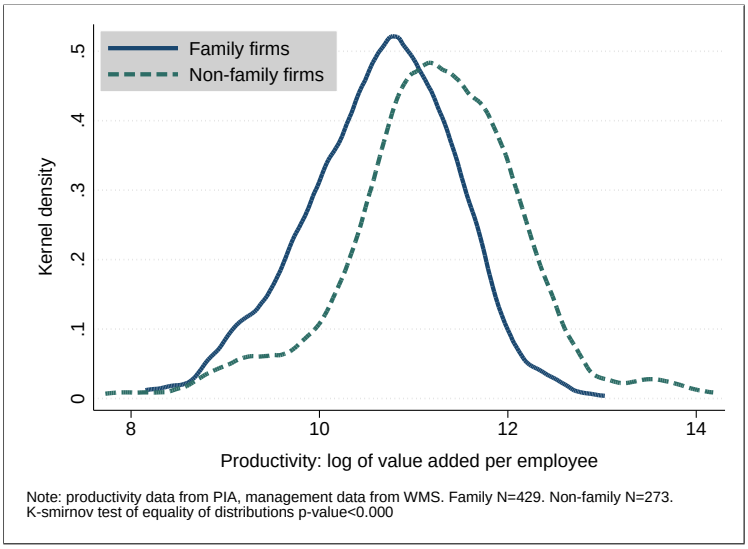


Figure A3: Prediction 3: Parameters determining the four equilibria space, for $\eta = .2$ and $\eta = .8$

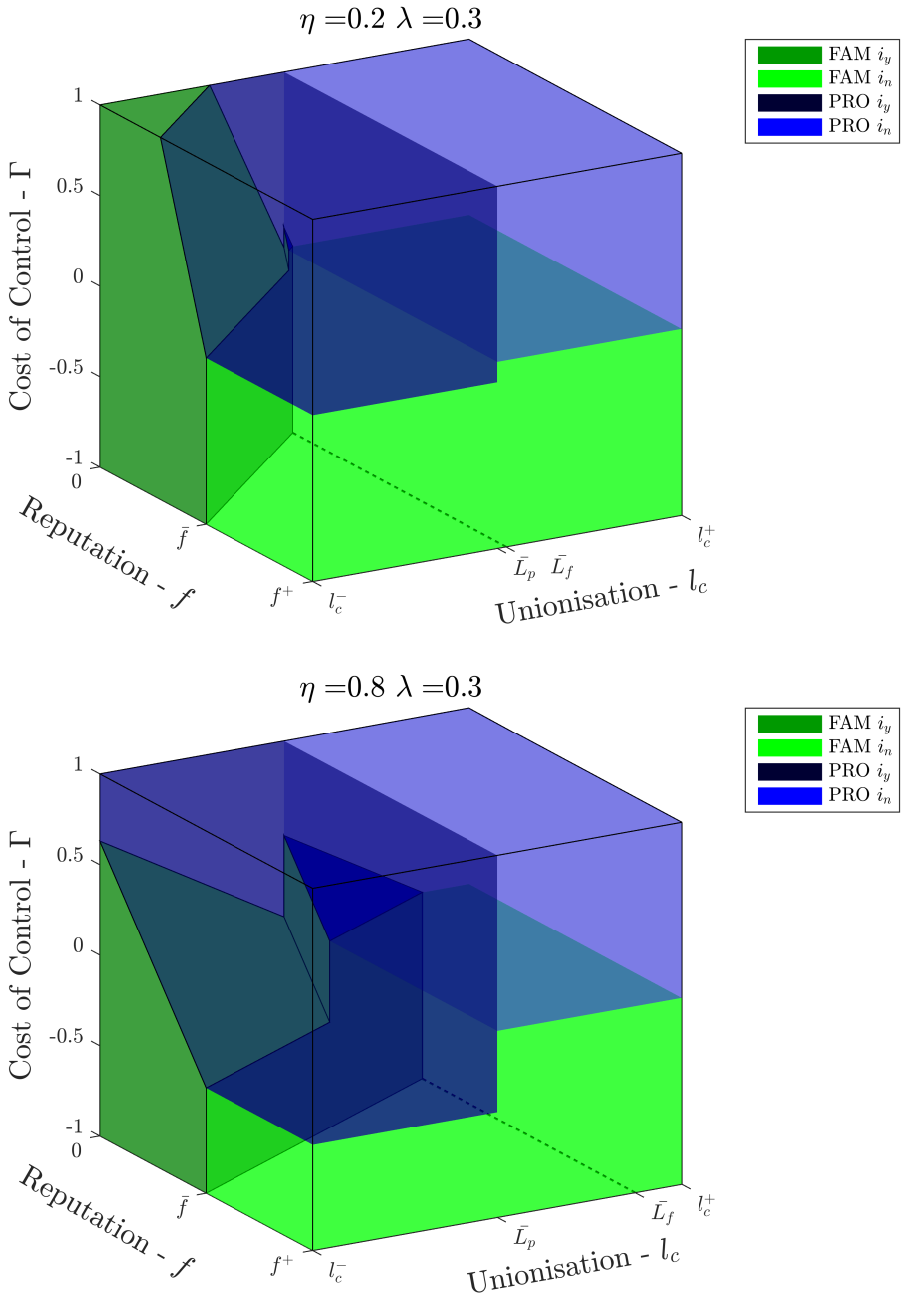
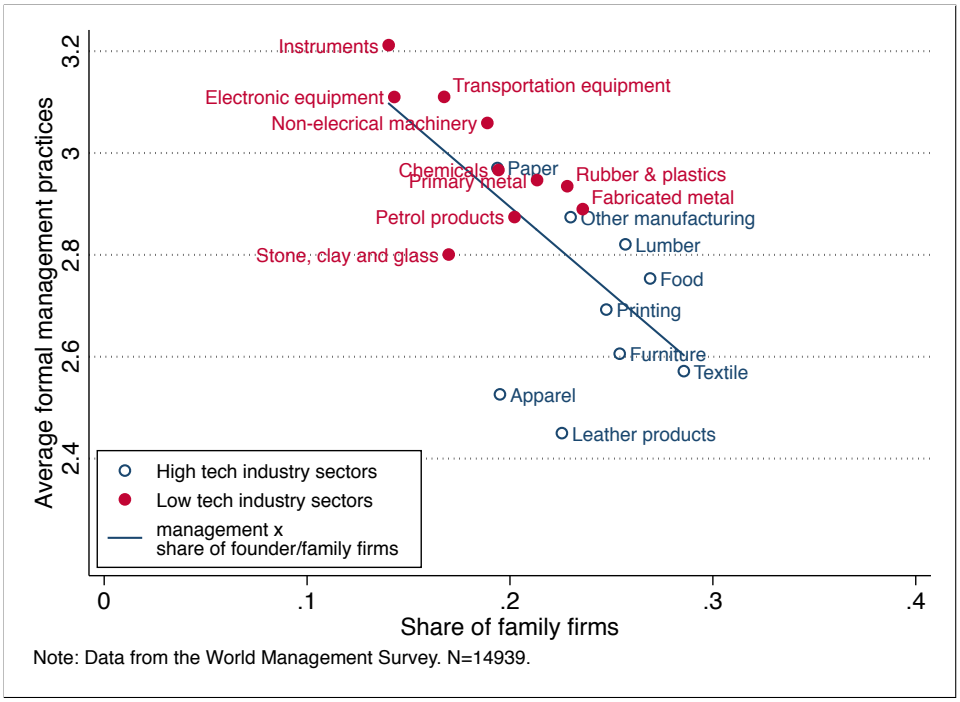


Figure A4: Share of family firms and average management scores, by industry



Note: Data from the World Management Survey. N=14939.

B Survey details

B.1 Ownership survey: data structure details

Figure B1 shows a diagram of a hypothetical firm surveyed both by the Ownership Survey and the WMS. In this example, the WMS surveyed this hypothetical firm once between $t = 1$ and $t = 2$. The Ownership Survey collected data on: the date of foundation ($t = 0$) and each date of succession ($t = 1$); who owned the firm at each time bracket and the family characteristics of the founder and each family owner-CEO after. In terms of the merged data, the family characteristics of the founder, who owned and managed the firm between $t = 0$ and $t = 1$, will be the instrumental variables for the WMS management measurement after $t = 1$.

For example, take two hypothetical Brazilian firms: Firm A is currently a "family firm" and Firm B is currently a "non-family firm." Firm A was founded in 1980 and its founder handed down control of the firm to his son in 2005, who is still presiding over the company. Firm B was founded in 1990 by a founder who decided to sell the firm in 2000 to a set of investors ("private individuals," by our categorization). These investors chose to hire a professional CEO to lead the firm. The firm today is still owned by these investors and the CEO continues to be the same professional hired in 2000. As the first WMS wave for Brazil was in 2008, we have a snapshot measure of the quality of management in both firms during the tenure of the founder's son for Firm A and during the tenure of the professional CEO in Firm B. We do not have measures for either of the founders' tenures in the earlier decades of these firms and thus cannot use panel data methods with the current dataset. The Ownership Survey collected information on the family characteristics of the founders of both firms and enables us to then use the gender composition of the founders' children as an instrument for the founders' choice of succession into another generation of a family firm or out of family control. Most of our data at the moment only has one management data point and complete data on the ownership background.

B.2 Ownership Survey: A brief illustration using the early days of the Ford Motor Company

Beyond understanding how our data is matched to the WMS, a crucial definition worth reiterating is that when we use the term *family firm* we mean family control of the firm in terms of the same family entity owning the majority of the voting shares of the firm *as well as* having a family member presiding over the company as CEO: *combined* ownership and control. To illustrate the data we collected and our definitions, it is useful to consider a well-known example such as the early days of the Ford Motor Company. Ford was founded in 1903 by Henry Ford, who had one son. In 1919 Henry Ford passed the position of CEO to his son, Edsel, until Edsel (unexpectedly) died in 1943. Edsel had four children: three boys and one girl. Henry Ford briefly took control for the interim two years until 1945 when Edsel's first son, Henry Ford II, returned to the US and assumed the helm of the firm. Henry Ford II had three children: two girls and one boy, Edsel Ford II.[30] In 1956, Ford went public in the largest IPO (initial public offering) of common stock shares in history at the time, but the Ford family still retained 40% of the voting shares.[31] Up

[30] Edsel Ford II ran Ford Australia between 1978 and 1980.

[31] According to Ford Motor Co.'s website. It is important to note that when they took the company public the family separated the type of stock offered into 95% Class A shares (no voting rights) and 5% Class B (voting

to this point, the Ford Motor Co. would be considered a *family firm* in the Ownership Survey as the Ford family held over 25% of the voting shares and a family member from the original founding family held the CEO position in the firm. We would have, thus far, registered three successions of power within the family.[32]

A *non-family firm*, on the other hand, has *separate* ownership and control. Continuing with the Ford Motor Co. example, in 1980 Phillip Caldwell became the first non-Ford-family member to take the post of CEO. From 1980 onwards Ford is considered a *non-family firm* in our analysis. The data point would be recorded as "family owned, professional CEO," but as discussed earlier, we combine all categories that are not owned and controlled by families under *non-family firm*. If the Ford family ever chose to divest or dilute their voting shares such that the family's voting ownership stake of the firm fell to below 25% of the shares, they would then continue to be coded as a *non-family firm* category, but their ownership sub-category would change to *dispersed shareholders*.[33] Crucially, our identification strategy would not use ownership successions that, for example, started as "family owned, professional CEO" and switched to "dispersed shareholders, professional CEO." Our identification is coming from firms that have successions of *control*, such as a "family owned, family CEO" firm hiring a professional CEO or, alternatively, selling the firm outright/diluting their shares to under 25% voting ownership to non-family investors who then hire a professional CEO.

A concern could be that what we capture with this strategy is the effect of the change in ownership rather than the change in control. The best scenario would, indeed, be to have a large sample of firms that switched from having family ownership and control to family ownership and professional control, but that is a limitation of our dataset (indeed, of "reality") that we do not think is fatal. First, although the family ownership with professional CEO structure is relatively more common in OECD countries than in middle- and low-income countries, it still constitutes a very small share of the overall ownership and control structures that we study. Among the countries we study it is an even smaller part of the share of firms in the economy. Thus, the next best alternative is comparing family owned and controlled firms with non-family owned and professionally controlled firms.

B.3 World Management Survey

One of the binding constraints for growth and development in emerging economies and low income countries is a lack of capital, both tangible and intangible. Investments in tangible capital such as better machines or other hard technology are relatively straightforward and often enacted by governments because of their greater visibility and ease of procurement, but there are large costs associated with such tangible capital upgrading programs. Investment in intangible capital such as organizational capital (ie. management practices) can often yield similar returns with lower levels of investment. For example, substantial improvements to organizational practices in firms can yield a return that could be comparable to increasing the workforce by 15% or capital by

rights) shares. The Ford family in fact owned less than 2% of the company as a whole, but crucially, they own 40% of the *Class B voting shares*, affording them majority control of the company.

[32] Henry Ford 1903-1919, Edsel Ford 1919-1943, Henry Ford 1943-1945, Henry Ford II 1945-1979.

[33] History of the Ford Motor Co. primarily obtained from the Ford Motor Co.'s website: https://corporate.ford.com/company/history.html, last accessed on January 15, 2016.

40%.[34] In education, a one standard deviation improvement in the quality of management in a school is associated with better student outcomes in year-end exams to the order of 0.2-0.4 standard deviations.[35]

The idea that *management matters* dates at least as far back as 1887, when Francis Walker wrote the following in the first volume of the Quarterly Journal of Economics: "It is on account of the wide range [of management quality] among the employers of labor, in the matter of ability to meet these exacting conditions of business success, that we have the phenomenon [...] of some employers realizing no profits at all, while others are making fair profits."

Since then, a large literature has developed around the idea of management and productivity, and universities have even launched a whole new set of professional schools focused on producing graduates of business administration. Empirical evidence on management practices, however, had been generally presented in the form of case studies, until Bloom & Van Reenen (2007) pioneered the use of a new survey tool to systematically measure the quality of management in manufacturing firms across countries. This new research finds that large variations in the quality of management across firms and countries are also strongly associated with differences in performance. For example, better managed firms tend to have significantly higher productivity, higher profitability, faster growth, higher market value (for quoted firms) and higher survival rates (see Bloom et al. (2014) for a survey).

The WMS is a unique dataset that measures the quality of management practices of firms via over 15,000 one-hour, structured phone interviews with plant managers. The data currently spans waves between 2002 to 2014, and includes 35 countries. The management survey methodology, first described in Bloom & Van Reenen (2007), uses double-blind surveys to collect data on firms' use of operations management, performance monitoring, target setting and talent management in their day-to-day runnings. The WMS focuses on medium- and large-sized firms, selecting a sample of firms with employment between 50 and 5,000 workers. The project is among a significant surge of emerging research on this subject, which has attempted to move beyond selective case studies and collect systematic and reliable data to empirically test management theories.

To measure management practices, the WMS uses an interview evaluation tool based on the questionnaire McKinsey & Co. uses in their baseline client evaluations. The tool was then adapted for research purposes and enhanced to include insights from the management literature that would be important for researchers to measure. For example, the WMS tool measures practices similar to those emphasized as relevant in earlier work in the management literature, by for example Ichniowski et al. (1997) and Black & Lynch (2001). The tool was piloted in 2002 and further refined, and since the first major wave in 2004 it has remained largely the same. The tool defines a set of 18 basic management practices and scores each practice on a scale from one ("worst practice") to five ("best practice") on a scoring grid.[36] A high score represents a best practice in the sense that firms adopting the practice will, on average, see an increase in their productivity. The combination of many of these indicators reflects "good management" as commonly understood, and the main measure of management practices represents the average of these 18 scores.

[34] World Management Survey team (n.d.)
[35] Bloom, Lemos, Sadun & Reenen (2015)
[36] The full instrument is available at `www.worldmanagementsurvey.org`

Conceptually, the scores suggest a gradual increase in formalization and usage of the management practices being followed. A score of 1 indicates little to no formal processes in place, and suggests the firm deals with day to day activities in a very ad-hoc manner. A score of 2 suggests that there are some informal processes in place, though they are enacted by the acting manager and not part of the "official" day to day running of the firm. If the manager was not in the plant for any reason, the practices would not be followed. A score of 3 indicates that a firm has some formalized management processes in place, though they have some weaknesses such as the process is not regularly reviewed or it is not often used properly. If the manager was away, however, the process could be picked up by a stand-in manager as it would be known as "normal running" of the firm by most staff. A score of 4 suggests that firms have good and flexible processes in place, that are routinely reviewed and are well-known to at least all managers in the firm. A score of 5 suggests that the firm not only has "best-practice" processes in place, but that these processes are deeply embedded in the corporate culture and have substantial employee buy-in, from the shopfloor, through middle management and up to the C-suite. It is considered that firms scoring under 2 are very badly managed firms, and those scoring over 4 are well-managed firms.

The survey measures management practices in three broad areas:

1. *Operations management & performance monitoring practices*: testing how well lean (modern) manufacturing management techniques have been introduced, what the motivation and impetus behind changes were, whether processes and attitudes towards continuous improvement exist and lessons are captured and documented, whether performance is regularly tracked with useful metrics, reviewed with appropriate frequency and quality, and communicated to staff, and whether different levels of performance lead to different process-based consequences.

2. *Target setting practices*: testing whether targets cover a sufficiently broad set of metrics, including short and long-term financial and non-financial targets, and whether these targets are based on solid rationale, are appropriately difficult to achieve, are tied to the firm's objectives, are well cascaded down the organization, are easily understandable and are openly communicated to staff.

3. *Talent management practices*: testing what emphasis is put on overall talent management within the firm and what the employee value proposition is, whether there is a systematic approach to identifying good and bad performers and rewarding them proportionately or dealing with bad performers.

Crucially, this methodology is uniquely useful because the types of questions asked ensure the survey is capturing how management practices are implemented in the firm, rather than how the managers feel or what their opinions are about management. The survey questions ask managers to describe their practices including several examples, and the interviewer independently evaluates the responses systematically on a pre-set scale. Thus, the WMS captures the degree of usage rather than the superficial adoption of these practices and abstracts from possible mood influences of individual managers. Beyond the key measure of management practices at the plant level, the WMS also collects a wealth of information on the firm, including firm location, size and ownership structure.

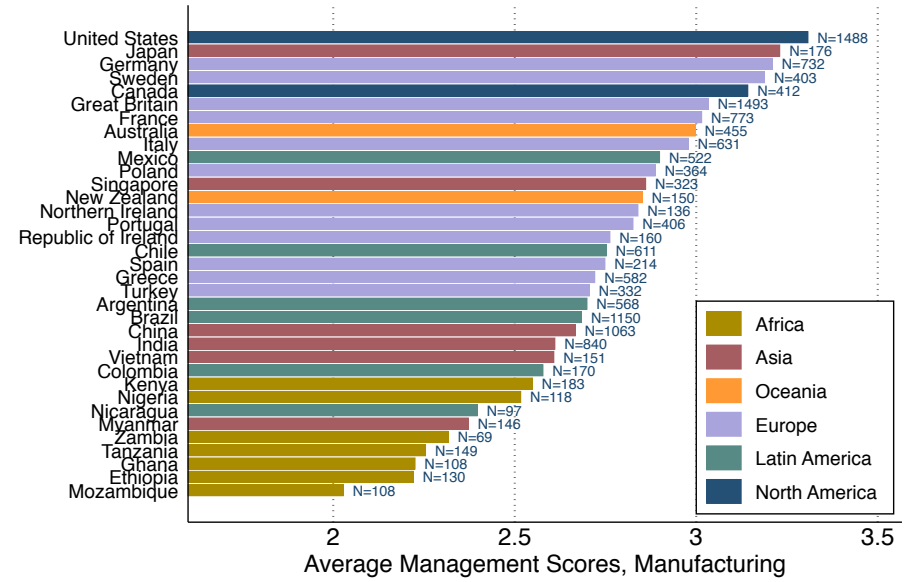
The management data has been collected in waves over 12 years with cross-section of firms in new countries added every wave as well as panel data for selected countries. The US, UK,

France, Germany, Italy and Greece were surveyed in 2004, 2006, 2010 and 2014. China, Japan, Poland, Portugal, and Sweden were surveyed in 2006 and 2010. India was surveyed in 2006, 2008 and 2010. Brazil was surveyed in 2008 and 2013. Canada and Ireland were surveyed in 2008. Australia and New Zealand were surveyed in 2009. Chile was surveyed in 2009 and 2013. Argentina and Mexico were surveyed in 2010 and 2013. Singapore was surveyed in 2012. Colombia, Ethiopia, Ghana, Kenya, Mozambique, Nicaragua, Nigeria, Spain, Tanzania, Turkey and Zambia were surveyed in 2013. Myanmar, Vietnam were surveyed in 2014.

One of the key stylized facts emerging from the WMS data is that firms in developing countries have much worse management practices than firms in developed countries. Figure B2 shows all countries in the WMS sample ranked by the average quality of management in the country. The ranking is surprisingly stable even after controlling for firm size, suggesting it is not simply a matter of rich countries having larger firms that are better managed. It is immediately clear that developing countries are at the bottom of the rank, with only the middle-income economies of Mexico and Chile placing among the top half of the country ranking.

Beyond a wide distribution of scores across countries, the data also shows that there is a substantial amount of variation within countries as well. In fact, Bloom et al. (2014) suggest that the low average quality of management in developing countries appears to be attributed to a large tail of badly managed firms coexisting with firms boasting world-class management practices. Figure B3 depicts this point, showing the distribution of the management measure across countries. The vertical line marks where the score of 2 is in each sub-graph, and it is immediately clear that in the lower-ranked countries such as, for example, India or Brazil, the mass of firms with a score under 2 is much larger than in countries higher up in the ranking such as the US, Germany or Great Britain. In Latin America and Asia, 15% of firms fall in this range while in Africa the share is just under 30%. In contrast, the share of firms scoring under 2 is only 2% in North America and 8% in Europe. Taking a closer look at the characteristics of firms populating the lower tail of the distribution yields a striking observation: 75% of the firms in Latin America and Asia in this range are family firms. The share is 60% in Africa, 35% in North America and 50% in Europe.

Figure B1: Developing countries rank lowest in quality of management



Notes: Graph created by the author using data from the World Management Survey. N indicates the number of firms in the sample. The WMS dataset is a random sample of manufacturing firms within the 50-5000 employee range.

Figure B2: There is wide variation of management quality within countries

Notes: Graph created by the author using data from the World Management Survey. The WMS sample includes firms between 50 and 5000 workers.

B.4 WMS topics

Practices	What is the WMS measuring
Operations Management and Performance Monitoring	
Introducing Lean (modern) Techniques	Measures how well lean (modern) manufacturing management techniques have been introduced
Rationale for introducing Lean (modern) Techniques	Measures the motivation/impetus behind changes to the operational processes, and whether a change story was well communicated turning into company culture
Continuous Improvement	Measures attitudes towards process documentation and continuous improvement
Performance Tracking	Measures whether firm performance is measured with the right methods and frequency
Performance Review	Measures whether performance is reviewed with appropriate frequency and follow-up
Performance Dialogue	Measures the quality of review conversations
Consequence Management	Measures whether differing levels of firm performance (not personal but plan/process based) lead to different consequences

Target Setting	
Target Balance	Measures whether targets cover a sufficiently broad set of metrics and whether financial and non-financial targets are balanced
Target Interconnection	Measures whether targets are tied to the organization's objectives and how well they cascade down the organization
Time Horizon of Targets	Measures whether the firm has a '3 horizons' approach to planning and targets
Target Stretch	Measures whether targets based on a solid rationale and are appropriately difficult to achieve
Clarity and Comparability of Targets	Measures how easily understandable performance measures are and whether performance is openly communicated to staff

People Management	
Managing Talent	Measures what emphasis is out on overall talent management within the organization
Rewarding High Performers	Measures whether there is a systematic approach to identifying good and bad performers and rewarding them proportionately
Removing Poor Performers	Measures how well the organization is able to deal with underperformers
Promoting High Performers	Measures whether promotion is performance-based and whether talent is developed within the organization
Retaining Talent	Measures whether the organization will go out of its way to keep its top talent
Creating a Distinctive Employee Value Proposition	Measures the strength of the employee value proposition

C Model

C.1 Equilibrium: preliminary analysis

Four actions with four binary choices lead the full game to be quite high in dimensionality. However, there are some actions that we can rule out as outcomes because they are never optimal for the actors to take. To reduce the dimensionality of the game and simplify the problem, these actions are replaced with their sub-game perfect equilibrium outcomes. The actions are as follows:

1. The CEO will never fire a worker who he observes exerting effort, since firing workers is a costly action. Thus, D_L is only not 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 ($e = \overline{e}$).
2. The worker will not exert effort unless the cost of effort is lower than the cost of being laid off. Workers choose low effort ($e = \underline{e}$) when:
   - the CEO chooses not to invest monitoring and thus cannot observe effort ($i = i_n$),

     or
   - the worker is of low ability.

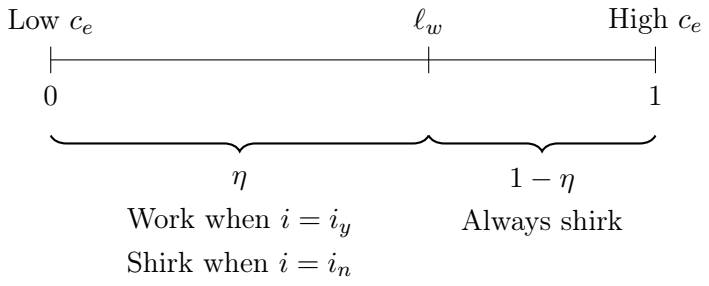
Therefore, eighteen out of thirty two outcomes can be replaced by their subgame perfect equilibria. For example, in both the branches where the CEO opts not to invest in monitoring ($i = i_n$), no firing happens as they cannot tell which workers shirked. We can replace all the relevant CEO disciplining choice branches with the outcome of D_K. Similarly, when workers know that they will not be caught shirking because the CEO did not invest in monitoring, they always choose to shirk as exerting effort is too costly in this context. Thus, we can replace all the relevant worker choice branches with the outcome of $e = \underline{e}$. Imposing these results yields the game tree in Figure B7, which is a relatively more straightforward problem to deal with.

To isolate the key insights of the model, one 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.

C.1.1 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 getting laid off l_w, such that $c_e \leq \ell_w$. These workers will choose to exert effort if they have a chance of getting laid off, and will

choose not to exert effort if they have no chance of getting laid off. There is a share of workers $1-\eta$ for which the cost of effort is above the cost of getting laid off, such that $c_e > \ell_w$. These workers will never exert effort, regardless of the chance of getting laid off. A way to interpret 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 $\lambda\pi(e)$ 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 & 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 c_{Mg}, but this cost would be included into the $\lambda\pi(e)$ payoff bundle. We are implicitly assuming that c_{Mg} 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.[37]

CEO firing costs All CEOs incur a common cost of firing workers, $\ell_c \in \{\ell_c^-, \ell_c^+\}$, where ℓ_c^- denotes the lowest cost possible across all industries and ℓ_c^+ 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_c closer to ℓ_c^+, or a country

[37] For example, Burkart & Panunzi (2006) assume professional CEOs have higher ability.

with lax labour laws relative to the average country having ℓ_c closer to ℓ_c^-.[38] The industry for each firm and worker is determined before the game.

Family CEOs incur an additional firm reputation utility cost, f if they have to discipline workers (regardless of effort). This cost 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 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 $\overline{L}$ at which the cost of disciplining workers is too high to be worth investing in monitoring. Because the cost is increasing in both ℓ_c and 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.

C.2 Backward induction

Figure B6 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 I will 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.

Fourth mover (last) — CEO: The last actor to make a decision is the CEO. He chooses whether he will fire the worker ($d = D_L$) or keep the worker ($d = D_K$). 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_K (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, $\overline{L}$, 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. $H_C = \{D_K, D_K, D_K\}$ if $\ell_c + f > \overline{L}$
2. $H_C = \{D_K, D_L, D_K\}$ if $\ell_c + f \leq \overline{L}$

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

(a) the worker shirks ($e = \underline{e}$)

and

(b) the CEO invested in monitoring ($i = i_y$)

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

and

(c) the costs of firing workers is below the threshold: $(\ell_c + f) \leq \overline{L}$.

If any of these three conditions is violated, the CEO will keep the worker ($d = D_K$). 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: $e = \underline{e}$, 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 ($c_e > \ell_w$), the action at all nodes will be $\underline{e}$. If they are of high ability type ($c_e \leq \ell_w$), the action at information set ν_A will be $\overline{e}$. In summary, the worker has two strategies:

1. $H_{W,L} = \{\underline{e}, \underline{e}, \underline{e}, \underline{e}\}$ if $c_e > \ell_w$ (low ability type)
2. $H_{W,H} = \{\overline{e}, \underline{e}, \underline{e}, \underline{e}\}$ if $c_e \leq \ell_w$ (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 ($e = \overline{e}$) under the following conditions:

(a) the worker is of high ability type ($c_e \leq \ell_w$)

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_c in his industry. This is the CEO's first action choice, before the second action choice of disciplining ($d \in \{D_K, D_L\}$). 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:

$$\begin{array}{rlllll} \text{Family CEO:} & \eta[\pi(\overline{e})] & +(1-\eta)[& \pi(\underline{e}) & -(\ell_c + f) \quad] & -m - \Gamma \\ \text{Professional CEO:} & \eta[\lambda\pi(\overline{e})] & +(1-\eta)[& \lambda\pi(\underline{e}) & -\ell_c \quad\quad\;] & -m \end{array}$$

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

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

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

$$\begin{array}{rrcll} \text{Family CEO:} & \eta\Delta\pi & \geq & (1-\eta) \quad (\ell_c + f) & +m \\ \text{Professional CEO:} & \lambda\eta\Delta\pi & \geq & (1-\eta) \quad (\ell_c) & +m \end{array}$$

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:

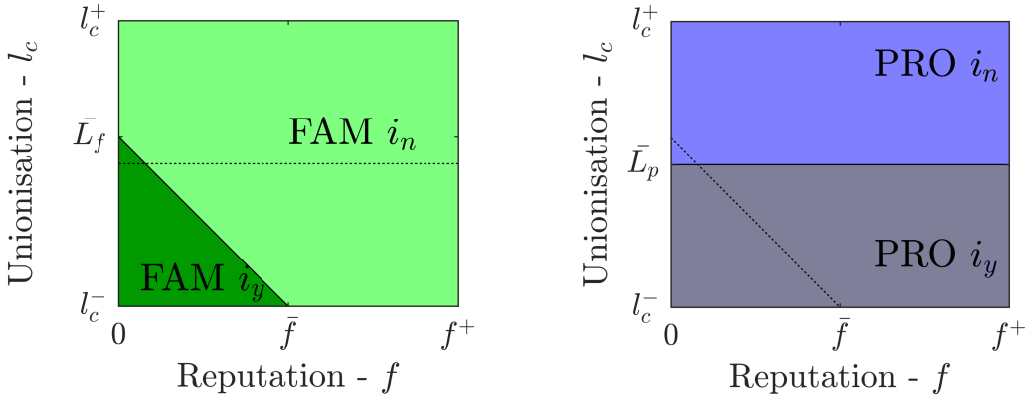
$$\text{Family CEO:} \quad \overline{L_f} \leq \frac{\eta\Delta\pi - m}{(1-\eta)}$$

$$\text{Professional CEO:} \quad \overline{L_p} \leq \frac{\lambda\eta\Delta\pi - m}{(1-\eta)}$$

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 B4 shows the two-dimensional space of ℓ_c and 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.

Figure B3: CEO investment decision: parameter space



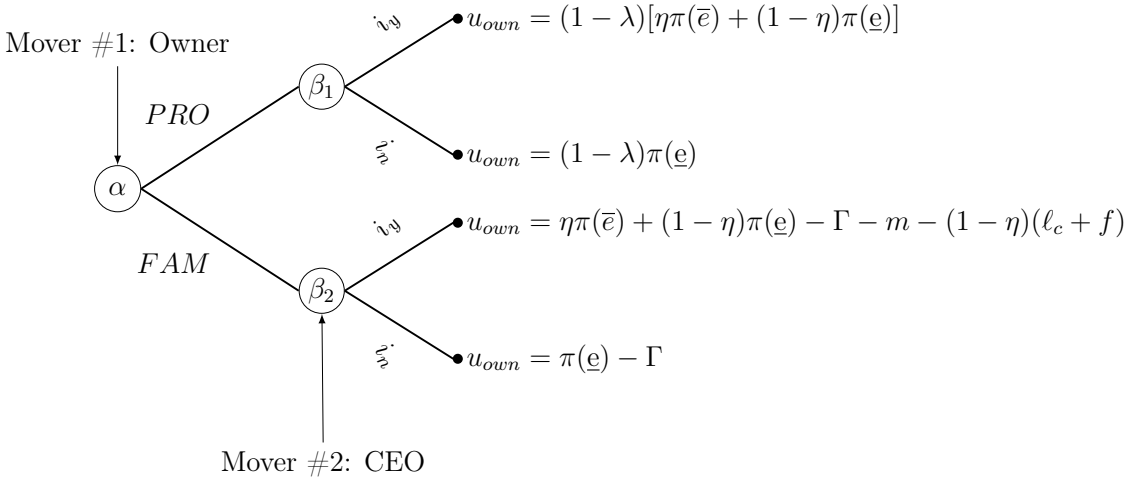
The CEOs full strategies at $\{\beta, \delta_A, \delta_B, \delta_C\}$ are:

1. $H_C = \{i_n, D_K, D_K, D_K\}$ if $\ell_c + f > \overline{L_f}$ (family) or if $\ell_c > \overline{L_p}$ (professional)

2. $H_C = \{i_y, D_K, D_L, D_K\}$ if $\ell_c + f \leq \overline{L_f}$ (family) or if $\ell_c \leq \overline{L_p}$ (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 B5 shows the owner's payoffs at each terminal node if we substitute the game for the subgame perfect equilibrium at that node.

Figure B4: 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 $\ell_c \leq \overline{L_p}$ and $\ell_c + f \leq \overline{L_f}$. The owner's choice is based on the following utilities:

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

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,[39] otherwise, he will choose $Mg = FAM$:

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

The conditions specifying where each equilibrium lies are as follows:

[39] Rearranging 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: $\lambda[\eta\pi(\overline{e}) + (1-\eta)\pi(\underline{e})] < \Gamma + m + (1-\eta)(\ell_c + f)$

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

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

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

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

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

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

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

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: $\ell_c \leq \overline{L_p}$ and $\ell_c + f > \overline{L_f}$. The owner's choice is then based on the following utilities:

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

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

$$Mg = PRO, i = i_y \quad \text{if:} \quad \frac{\Gamma}{1-\eta} > \overline{\Gamma} + \overline{L_p} - \overline{L_f}$$

$$Mg = FAM, i = i_n \quad \text{if:} \quad \frac{\Gamma}{1-\eta} \leq \overline{\Gamma} + \overline{L_p} - \overline{L_f}$$

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: $\ell_c > \overline{L_p}$ and $\ell_c + f \leq \overline{L_f}$. The owner's choice is then based on the following utilities:

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

- $\mathrm{u}_{own}(FAM, i_y) = \eta\pi(\overline{e}) + (1-\eta)\pi(\underline{e}) - \Gamma - m - (1-\eta)(\ell_c + f)$

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

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

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

C.3 Theoretical framework: game trees

Additional game trees The information sets are shown in nodes of the summary game tree in Figure B7, and are shown inside the nodes when they are singletons and inside the dashed lines when they are sets. Let α be the information set when the owner chooses who to manage the firm. Let β_1 and β_2 be the information sets at the time the CEOs take their investment action. Let ν_1 to ν_8 be the information sets at the time that the worker has to take their effort action. Let δ_1 to δ_6 be the information sets at the time the CEO has to take their disciplining action.

Figure B8 shows the full game tree, with all the nodes but omits the payoffs. The information sets are depicted by dashed lines and labelled above the set.

Figure B5: Game tree: CEO's investment decision

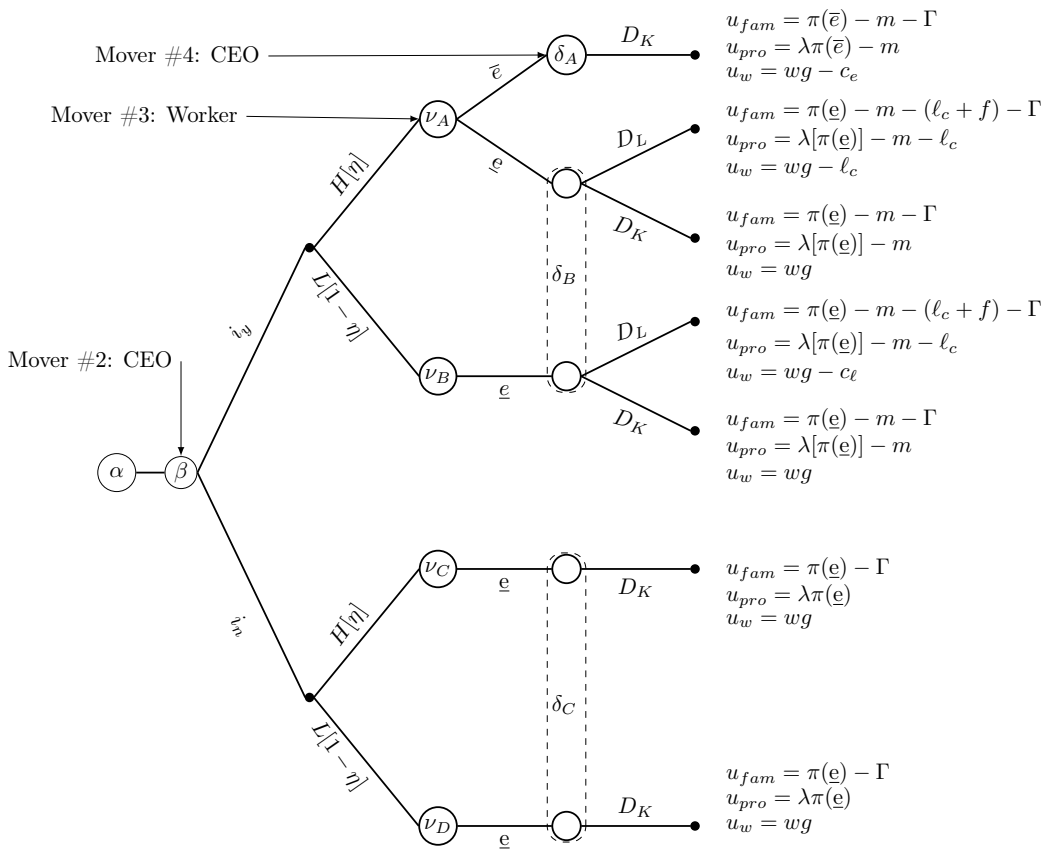
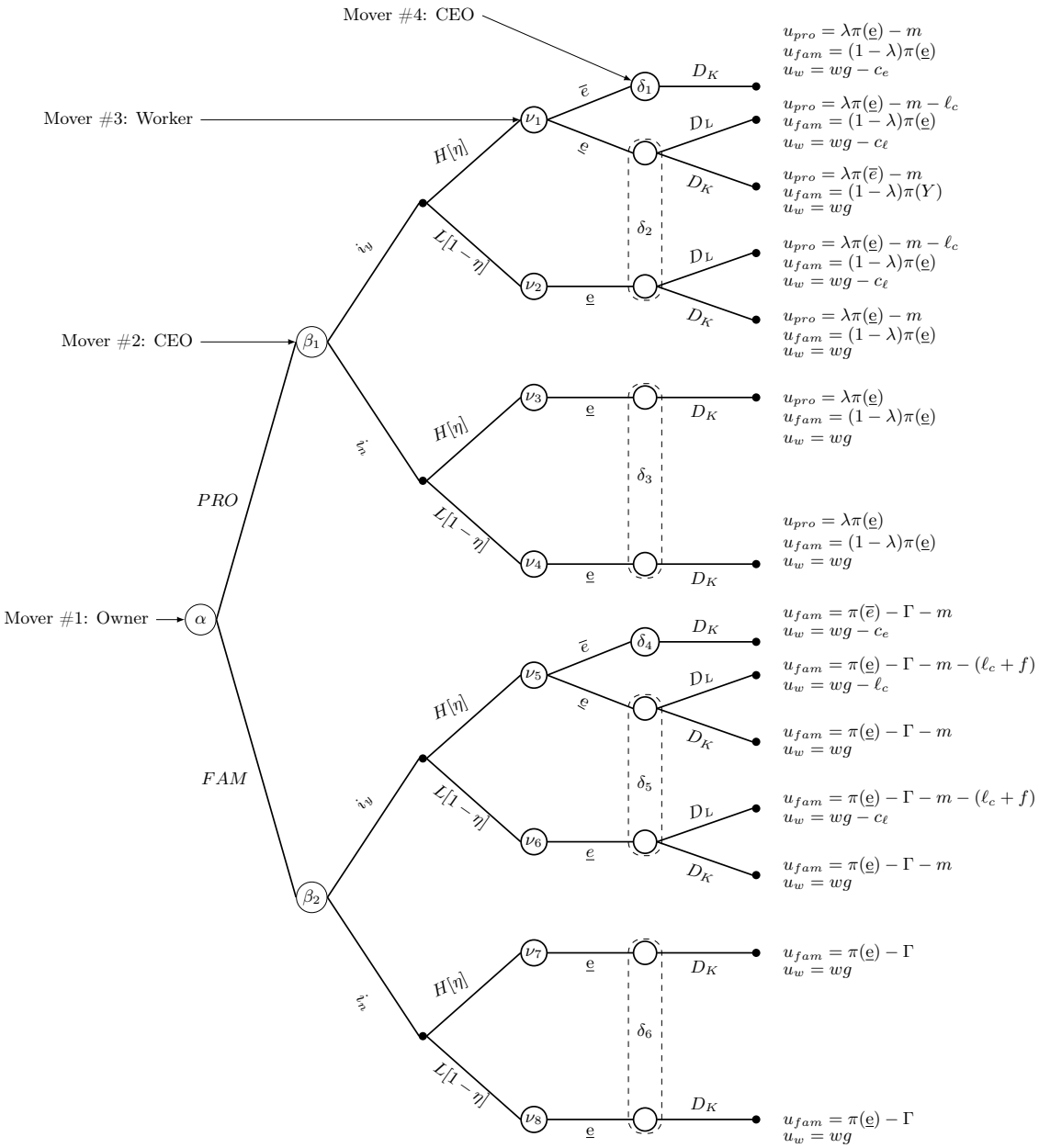


Figure B6: Game tree: summary decision set



CENTRE FOR ECONOMIC PERFORMANCE
Recent Discussion Papers

1527	Stephen Machin Matteo Sandi	Autonomous Schools and Strategic Pupil Exclusion
1526	Stephan E. Maurer	Oil Discoveries and Education Spending in the Postbellum South
1525	Paola Conconi Manuel García-Santana Laura Puccio Roberto Venturini	From Final Goods to Inputs: The Protectionist Effect of Rules of Origin
1524	Zack Cooper Fiona Scott Morton Nathan Shekita	Surprise! Out-of-Network Billing for Emergency Care in the United States
1523	Zack Cooper Amanda Kowalski Eleanor Neff Powell Jennifer Wu	Politics, Hospital Behaviour and Health Care Spending
1522	Philippe Aghion Ufuk Akcigit Ari Hyytinen Otto Toivanen	The Social Origins of Inventors
1521	Andrés Barrios F. Giulia Bovini	It's Time to Learn: Understanding the Differences in Returns to Instruction Time
1520	Sara Calligaris Massimo Del Gatto Fadi Hassan Gianmarco I.P. Ottaviano Fabiano Schivardi	The Productivity Puzzle and Misallocation: An Italian Perspective
1519	Alex Bell Raj Chetty Xavier Jaravel Neviana Petkova John Van Reenen	Who Becomes an Inventor in America? The Importance of Exposure to Innovation

1518	Randolph Bruno Nauro Campos Saul Estrin Meng Tian	Economic Integration, Foreign Investment and International Trade: The Effects of Membership of the European Union
1517	Fabrice Defever José-Daniel Reyes Alejandro Riaño Miguel Eduardo Sánchez-Martín	Special Economic Zones and WTO Compliance: Evidence from the Dominican Republic
1516	Philippe Aghion Ufuk Akcigit Matthieu Lequien Stefanie Stantcheva	Tax Simplicity and Heterogeneous Learning
1515	Fabrice Defever Christian Fischer Jens Suedekum	Supplier Search and Re-Matching in Global Sourcing: Theory and Evidence from China
1514	Philippe Aghion Antonin Bergeaud Timo Boppart Peter J. Klenow Huiyu Li	Missing Growth from Creative Destruction
1513	Stephen J. Redding David E. Weinstein	Aggregating from Micro to Macro Patterns of Trade
1512	Andrew E. Clark Tom Lee	Early-Life Correlates of Later-Life Well-Being: Evidence from the Wisconsin Longitudinal Study
1511	Clément Bosquet Pierre-Philippe Combes Cecilia García-Peñalosa	Gender and Promotions: Evidence from Academic Economists in France

The Centre for Economic Performance Publications Unit
Tel: +44 (0)20 7955 7673 Email info@cep.lse.ac.uk
Website: http://cep.lse.ac.uk Twitter: @CEP_LSE