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Family Firms and Contractual Institutions

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Abstract

This paper offers new evidence on the relationship between contractual institutions, family management, and aggregate performance. The study creates a new firm-level database on management and ownership structures spanning 134 regions in 11 European countries. To guide the empirical analysis, it develops a model of industry equilibrium in which heterogeneous firms decide between family and professional management when the latter are subject to contracting frictions. The paper tests the model's predictions using regional variation in trust within countries. Consistent with the model, the finding show that there is sorting of firms across management modes, in which smaller firms and those in regions with worse contracting environments are more likely to be family managed. These firms are on average 25 percent less productive than professionally managed firms, and moving from the country with the least reliable contracting environment to the most increases total factor productivity by 21.6 percent. Family management rather than ownership drives these results.

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FAMILY FIRMS AND CONTRACTUAL INSTITUTIONS*

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I. INTRODUCTION

Family firms are ubiquitous, particularly in emerging economies (e.g. La Porta, Lopez-de-Silanes and Shleifer 1999). While the evidence is mixed on whether family ownership is beneficial to firm performance, a large and growing literature suggests that family-managed firms have substantially worse managerial quality and performance than those with professional managers. Understanding the forces that drive the decision of firms to be family-managed is therefore potentially important in explaining productivity differences across countries.

This paper provides new evidence on the way in which weak contracting environments affect the choice of firms to be family-managed, and assesses this channel's importance in explaining cross-country productivity differences. First, we construct a new dataset on firm management and ownership structures that includes over 119,000 firms from 134 regions across 11 European countries. Second, to guide our analysis we develop an equilibrium model where heterogeneous firms sort across family and professional management modes when the latter are subject to contracting frictions. Third, we test a number of unique predictions from the model using regional variation in a proxy for contracting institutions–trust–within countries. In contrast to the prior literature which has relied on cross-country comparisons, this allows us to to difference out country-level unobservables. Our results support the idea that by increasing the cost of hiring professional managers, weak contracting environments lower productivity by constraining the large firms who hire them and causing more firms to use less productive family managers.

Theories of family firms can be broadly classified into two categories. On the one hand, family ownership can provide a "competitive advantage" allowing firms to achieve superior economic outcomes than non-family counterparts. On the other hand, the "private benefits of control" view emphasizes that family firms might maximize value for the family rather than investors overall (Bertrand and Schoar 2006, Villalonga and Amit 2010). The empirical evidence established so far, though, is mixed. The positive effect of family ownership on firm value has been documented by Anderson and Reeb (2003), Villalonga and Amit (2006) and Fahlenbrach (2009), where the latter two emphasize the role of the founder CEO on firm value. This supports the efficiency of family firms inherent to the competitive advantage explanation.[1]

While there is evidence of the potential negative effects of family ownership,[2] a growing literature emphasizes the detrimental effects of family management on firm performance. Bloom and Van Reenen, (2007) show that family firms in Europe are characterized by worse managerial practices, confirmed for a broader sample including developing countries by Lemos and Scur (2018). Morck, Strangeland and Yeung (2000), Pérez-González (2006) and Villalonga and Amit (2006) show that family firms' performance falls once the active management of the firm transitions from the founder to his or her descendants. This supports the

[1]This could arise, for example, if family owners have longer time horizons than investors which improve long-run firm performance. Botticelli and Barnes (1997) and Eisenmann (2000) provide evidence in support of this in the history of the US media industry. Bertrand (2009) highlights how family owners may also be more committed to the firm that outside investors. Khanna and Palepu (2000) and Sraer and Thesmar (2007) are two other notable examples of family firms performing better than their counterparts. Indeed, this view is contained within a long strand of literature going back at least to Berle and Means (1932), see Bertrand and Schoar (2006) for a review.

[2]For example, Bertrand, Mehta, and Mullainathan (2002) provide evidence that family owners in India can "tunnel" resources out of firms for their own benefit. Bertrand et. al. (2005) study business groups in Thailand and show that firm performance declines when founders cede firm control to their sons after retirement.

evidence in Bloom and Van Reenen (2007) and Bloom et. al. (2012) that inherited family-owned firms who appoint a family member (especially the eldest son) as CEO are very badly-managed on average. Bennedsen et. al (2007) use the gender of a departing owner-CEO's first-born child as instrument for patrimonial succession to support the causal nature of this relationship.

The evidence on the poor performance of family-managed firms therefore begs the questions: what causes firms to be family-managed, and what is the impact on aggregate performance? One potential explanation is that family management can substitute for weak legal structures, since trust between family members can be a substitute for weak contractual enforcement that can enable outside managers to expropriate resources from the firm (La Porta et. al. 1997, Burkart, Panunzi, and Shleifer 2003).[3] However, empirical evidence on this hypothesis is mixed both because previous efforts have focused on cross-country comparisons that are subject to omitted variable biases (La Porta, Lopez-de-Silanes and Shleifer 1999, Holmén and Högfeldt 2004, Roe 2003) and it is often challenging to disentangle family ownership from family management in the data.[4]

This paper makes three contributions to our understanding of the causes and effects of family management. First, we create a unique database that offers a more systematic and comprehensive view of the incidence of family management and ownership than previously possible. La Porta, Lopez-de-Silanes and Shleifer (1999), with an eye to understanding the ownership structures of large firms, compiled data on largest 20 firms (by stock market capitalization) in 27 rich countries using the WorldScope database.[5] Addressing a broader spectrum of firms, the World Management Survey (WMS) (Bloom and Van Reenen 2007) advanced the literature significantly by asking explicit questions on ownership/management structure variables across a broader spectrum of firms, but overall sample size within and across countries remains modest.[6]

To expand coverage, we construct a new dataset on firm management and ownership structures as well as regional characteristics that covers over 119,000 firms from 134 regions across 11 European countries. We draw on the Amadeus (Bureau Van Dyke) database that offers consistent data on firm performance as well as the full names of owners and managers which we then match to systematically measure management modes. To validate our measures, we show they are highly correlated with the explicit measures of family

[3]Indeed, Bloom et. al. (2013) argue that Indian textile firms do not hire professional managers because if they steal from the plant or receive kickbacks in exchange for inflated materials prices, and even if discovered, the owner's ability to successfully prosecute them and recover the assets is likely minimal because of the inefficiency of Indian courts.

[4]Bertrand and Schoar (2006) make the point that family-controlled businesses are still common in countries like the US and Sweden with excellent investor protection. Claessens, Djankov, Fan, and Lang, (2002) find that family firms underperform relative to nonfamily firms even in Southeast Asian countries with low investor protection. Both moments suggest that weak institutions cannot fully explain family control, and that is not what we want to put forward in this paper. Indeed, the higher fixed costs of professional management in our model (one interpretation of which is the disamenity from not employing family members as managers) predicts that family-managed firms will exist even with perfectly enforced contracts. Instead, we use changes in trust across regions within countries to show that firms with the same observable characteristics are relatively more likely to be family-managed in regions within countries characterized by low trust.

[5]Others have also worked with similar sized datasets. Claessens, Djankov and Lang (2000) look at 2,980 firms in 9 east Asian countries Lins (2003) covers 1,433 firms in 18 emerging markets. Faccio and Lang, (2002) use data on 232 big and medium-sized corporations in Western Europe. Franks, Mayer, Volpin, and Wagner (2012) span 27,684 large firms with more than 50mn Euros in sales across 27 European countries. Foley and Greenwood (2010) examine 2700 firms in 34 countries. In addition, most focus on family ownership rather than differentiating the effects of ownership from management.

[6]In particular, the WMS covers 8,481 firms across 18 countries with an average of 471 firms per country compared to 10,360 average firms per country in our database.

management from the smaller sample of the WMS. This unique database enables us to establish a set of new stylized facts concerning the sorting of firms across management modes according to firm, regional and national characteristics.[7] Importantly, by working at the subnational level, we are able to purge national characteristics that may be correlated with institutions or trust.

Second, to discipline the empirical analysis, we develop a simple model of an industry equilibrium in the spirit of Melitz (2003) in which heterogeneous firms decide between family and professional management when the latter are subject to contracting frictions. Motivated by the findings in Bloom et. al. (2013), we assume that due to span-of-control limitations entrepreneurs can increase productivity by delegating managerial tasks to professional managers. The cost of this delegation is that outside managers may not act in firms' interests, and the quality of legal institutions or enforcing social norms determine the ability of owners to recoup costs in this event. Hence, when contracting institutions are weak, fewer firms adopt the more productive professional management mode. Aggregate total factor productivity (TFP) then falls as the most productive firms remain suboptimally small, intermediate-sized firms sort into less productive family management, and the least productive firms survive due to the resulting decrease in competition.

Our framework is closely related to Burkart, Panunzi and Shleifer (2003) who develop a model where a founder chooses between his or her heir and a more productive professional manager, and characterize how this decision is shaped by the legal environment. In contrast, we incorporate heterogeneity in firm productivity within a general equilibrium setting. This allows us to characterize how these choices might affect firms differentially across the size distribution (which we find support for in the data) as well as the aggregate effects on TFP. These results are important since they imply that only the behavior of certain types of firms is distorted by weak contracting institutions through the family management channel. Our model also relates to Caselli and Gennaioli (2013) and Akcigit, Alp and Peters (2016) who calibrate dynamic models of family management induced by a weak contracting environment. While our model is also general equilibrium, equilibrium can be solved in closed form which allows us to parsimoniously derive predictions characterizing the sorting of firms across management modes and the effects of contracting institutions on firms' managerial choices. The model also yields a simple and intuitive sufficient statistic for aggregate productivity that depends on the share of professionally-managed firms in the economy.

Third, we show that the patterns in the data are consistent with the predictions of the model to show how contractual institutions relate to the incidence of family firms and aggregate performance. In contrast to the existing literature that examines cross-country correlations between family firms and legal institutions (e.g. La Porta, Lopez-de-Silanes and Shleifer 1999, Burkart, Panunzi and Shleifer 2003, Aminadav and Papaioannou 2018), we are able to leverage our large sample size to examine how management modes respond to changes in proxies for the contractual environment across regions within countries. Given the lack of sub-national measures of rule of law or contracting institutions, our analysis centers on using within-country variation of the World Values Survey measure of trust as a measure of enforcement of social norms

[7] In parallel work, Aminadav and Papaioannou (2018) draw on Orbis to generate data on 40,000 listed firms in 127 countries and explore determinants of a wide variety of types of corporate control in listed firms in 127 countries. This enables them to to trace controlling shareholders from the often obscure corporate structures and identify large differences in types of corporate control across and within continents and correlate these structures with legal traditions. Our paper differs in its focus on family management, using regional variation in trust to examine the effects of institutions on firm management choices, and drawing out the implications of these effects on aggregate productivity through the lens of our model.

or as a proxy for confidence in contracts. As described below, this is highly correlated with measures of rule of law and contract enforcement at the country-level. By controlling for country-level unobservables and region characteristics (such as GDP per capita and the share of college-educated workers), the correlation between residual variation in trust and region-level unobservables is likely less severe than at the country-level. Relative to the small number of papers that use regional variation to examine the relation between institutions and management (Amit et. al. 2015, Akcigit et. al. 2016), our large sample spanning 134 regions allows to cluster standard errors at the region-level (at which the explanatory variable of interest varies) for correct inference and examine heterogeneous effects across countries.[8]

We find that in regions characterized by a lower level of trust, firms are more likely to be family-managed and family-managed firms are relatively larger. This is consistent with the sorting patterns predicted by our model. Highlighting the importance of our approach that leverages regional variation within countries, we find that cross-country specifications overestimate trust's effect on family management by about 50%.[9] In further support of the mechanism behind our findings, we employ the Levchenko (2007) measure of product complexity at the industry-level and show that our results are stronger within more complex industries which are likely to be particularly sensitive to the external contracting environment as predicted by our framework.

While La Porta, Lopez-de-Silanes and Shleifer (1999) and Aminadav and Papaioannou (2018) focus on ownership structure, as in Villalonga and Amit (2006) we are able to break apart family ownership from management and explore which drives differences in firm performance. We find that (i) founder firms (i.e. young, family firms) perform better than their older counterparts and that (ii) family-owned but professionally-managed firms perform better than those which are both family-owned and family-managed. This reinforces the Bloom and Van Reenen (2007) findings that primogeniture is especially harmful for management practices, and provides additional evidence that it is family management rather than family ownership that is detrimental to firm performance.

Lastly, we show important impacts of managerial type on firm productivity and aggregate performance. Family-managed firms are on average 24.8% less productive than professionally-managed firms. Our prior results therefore suggest that strong contractual institutions should raise aggregate productivity by lowering the share of family-managed firms. Using our sufficient statistic approach that allows to us to relate changes in trust to changes in TFP through its effect on the share of professionally-managed firms, we find that a one standard deviation increase in trust increases TFP by 2.68% and that moving from the minimum trust region to the maximum increases TFP by 14.65%. Stepping back to the national-level where we can use the rule of law index directly, we find that a one standard deviation increase in a country's rule of law increases TFP

[8]First, Amit et. al. (2015) examine how family ownership and management respond to regional variation in measures of institutional development in China. The institutional variables measure investment climate (e.g. taxes, bureaucratic and customs delays) and economic development (average firm market value) rather than trust. Their data have only 6 observations of these institutional outcomes across regions. Second, Akcigit, Alp and Peters (2016) have an empirical component to their paper that uses variation in trust across Indian states. However, their data only provides information on family ownership, while our data allows to us to explicitly measure whether or not firms are family-managed. They also only have 22 observations of trust (Indian states). In contrast, our data spans 134 regions in 11 countries which gives us enough power to cluster standard at the region-level to identify the effect of trust on managerial decisions.

[9]The direction of this bias intuitive: countries with higher trust (our proxy for contractual institutions) are likely to have other unobservables that also increase the relative return to professional management. For example, better overall economic conditions may increase the benefit from hiring outside managers if firms anticipate that professional managers will allow them to expand in the future.

by 7.9% and that moving from the minimum to the maximum rule of law countries (which, in our sample, is from Russia to Norway) increases TFP by 21.6%. Our findings therefore highlight a quantitatively important channel through which institutional differences drive productivity differences across countries and regions.

The main drawback of our study is the lack of exogenous variation in (proxies for) the quality of contracting institutions. While we perform an exercise using historical institutions as a potential exogenous driver of contemporary trust as in Tabellini (2010) (described below), in general it is a challenge throughout the literature to find an instrument for trust that is is wholly uncorrelated with regional unobservables. Nevertheless, we believe our results advance the literature by providing new empirical patterns that control for country-level unobservables and region characteristics. Indeed, our cross-country estimates are twice as large in the absence of these controls. More broadly, since the patterns borne out in the data are consistent with our model's multiple predictions, they support its narrative that legal institutions lower aggregate performance by causing more firms to sort into less productive family management.

There are several other limitations which we address through robustness checks. First, we lack a measure of legal institutions at the region level. In support of using trust as a proxy, we show that it is highly correlated with measures of the rule of law (from the Worldwide Governance Indicators) and contract enforcement (from the World Bank Doing Business Survey) across countries. Second, since there are a number of ways to define family management we show our results are robust to a variety of alternatives. Third, we address the difficulty in measuring the operating location of multi-plant firms by showing the results hold on a sample of smaller firms who are less likely to operate multiple establishments. Fourth, we re-run our main specifications under a number of alternative sampling rules to show the way in which we construct our main sample does not drive our results. Fifth, we show our results hold if we measure firm size by assets rather than employees. Sixth, we document the reduced form relationship between family management and a measure of early historical political institutions from Acemoglu, Johnson, and Robinson (2002) used in Tabellini (2010) to instrument for measures of culture and trust. We believe this provides one more piece of evidence that the patterns we document in the data are not merely spurious.

The rest of the paper is structured as follows. Section 2 outlines the model and derives its main predictions. Section 3 describes the various data sources and how the variables are constructed. Section 4 presents empirical results, both cross-country evidence as well as within-country regressions which exploit subnational variation in our proxy for contractual institutions. These results are followed by robustness checks. Section 5 concludes and discusses the implications of our findings.

II. A Stylized Model of Managerial Choice

To guide our empirical analysis, we develop a stylized model of the sorting of heterogeneous firms between management modes in the presence of contracting frictions. Our framework is based on the models of industry equilibrium developed by Hopenhayn (1992) and Melitz (2003). In contrast to the application of these models in the trade literature, where the main choice made by firms is over whether or not to export, we concentrate on the choice over management modes (i.e. between family and professional management). While hiring professional managers makes firms more productive, reflecting the fact that delegating management

tasks increases an entrepreneur's span-of-control, it also introduces a moral hazard problem between the owner and manager absent under family management. We treat the quality of contractual institutions as affecting the ability of owners to punish managers who act against the interest of the firm, thereby limiting the moral hazard problem. Our model predicts a sorting pattern of firms across management modes, with more productive firms willing to pay the overhead costs of employing managers in exchange for the reduction in marginal costs which accrue through the boost to productivity. We then examine comparative statics of how changes in contracting institutions affect the sorting of firms through both partial and general equilibrium effects, and how this affects industry aggregates.

In what follows we provide an overview of the model; see Section C of the Online Appendix for details. Furthermore, in Section E of the Online Appendix we consider two extensions to the model: the first includes firm heterogeneity in the line of Lucas (1978), in which we explicitly model an entrepreneur's span-of-control, while the second allows firms to choose how much to monitor managers. The qualitative predictions remain unchanged.

II.A. Model

Consumers. Consider an economy with mass L of workers and mass L^M of managers. Both have CES preferences with an elasticity of substitution σ over consumption of the set of available varieties Ω

$$U = \left(\int_{\Omega} c(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right)^{\frac{\sigma}{\sigma-1}}. \tag{1}$$

Aggregate income in the economy is given by $Y = wL + w_M(1-u)L^M$, where $u \in [0,1]$ is the unemployment rate of managers to be solved for in equilibrium. Letting $P = \left(\int_{\Omega} p(\omega)^{1-\sigma} d\omega \right)^{1/(1-\sigma)}$ denote the CES price index, aggregate demand for each product $\omega \in \Omega$ is given by $y(\omega) = p(\omega)^{-\sigma} Y P^{\sigma-1}$.

*Firms and Managerial Technologies***.** The supply side of the economy is characterized by monopolistic competition. There is free entry of firms which hire $f^e > 0$ units of labor to draw a productivity $\varphi \sim G(\cdot)$ with support over the positive reals. If firms choose to produce, they choose between family management F and professional management M. These two production technologies are given by

$$y_F(\varphi) = \varphi \ell(\varphi) \tag{2}$$

$$y_M(\varphi) = \varphi \lambda \ell(\varphi)^{\alpha} m(\varphi)^{1-\alpha} \tag{3}$$

When firms are family-managed, technology is linear in labor. When firms are professionally-managed, they receive a boost to productivity $\lambda > 1$ and use a Cobb-Douglas aggregate of workers and managerial inputs. As mentioned above and shown in the Online Appendix, our results are unchanged if we assume goods are perfect substitutes in consumption but firms instead face span-of-control in production which can be muted by hiring professional managers.

Workers are hired in a Walrasian market at wage w which is normalized to one. However, the firm cannot perfectly observe the supply of managerial services rendered by managers at any wage w_M. Each

manager provides services $m_s \in \{0, 1\}$ depending on whether or not the manager acts in the interest of the firm. If the manager acts in the interest of the firm, she pays a disutility cost $e > 0$ and receives $w_M - e$. If she shirks, she avoids this cost but is caught (and punished) by the firm with probability $p \in (0, 1)$ and receives a payout of 0, leaving her expected payment equal to $(1-p)w_M$. Since output is zero in the case of shirking, the firm always wants to induce effort. The wage offered to the manager must therefore satisfy the incentive compatibility constraint $w_M - e \geq (1-p)w_M$. Managers cannot be workers and face an outside option normalized to zero. Their participation constraint is therefore $w_M - e \geq 0$. Putting these together, the firm pushes down the managerial wage until the incentive compatibility constraint bind, so that

$$w_M = \frac{e}{p}. \tag{4}$$

We interpret the quality of legal institutions, specifically contract enforcement, as affecting the probability of detection p. This determines the share of the ex-ante agreed payment the manager receives when acting against the interest of the firm. Better legal institutions allow owners to recoup costs in cases of non-compliance and therefore increase p. However, p also reflects the monitoring technology available to the firm. Recent evidence has shown that monitoring is highly heterogenous both within and across countries, and is systematically related to firm size (Bloom and Van Reenen 2007). Here we impose that monitoring intensity is exogenous for simplicity; this is relaxed in the Online Appendix and our qualitative results are unchanged.

Finally, firms face fixed costs $f > 0$ to produce under family management and $f_M > f$ to produce under professional management. One interpretation is that this reflects the monitoring costs involved in producing using professional management, in addition to other overhead expenses such as recruitment costs. Another is that $f_M - f$ is the disamenity from not employing a family manager, as emphasized by Bertrand and Schoar (2006), Burkhart et. al. (2003).[10]

Sorting Across Management Modes. Given this setup, the managerial choice of a firm with productivity φ is simply $i(\varphi) = \arg\max\{\pi_F(\varphi), \pi_M(\varphi)\}$, where $\pi_i(\varphi)$ is the profit function under management mode i

$$\pi_F(\varphi) = A\varphi^{\sigma-1} - f \tag{5}$$

$$\pi_M(\varphi) = A\left(\varphi/c_M\right)^{\sigma-1} - f_M, \tag{6}$$

where $c_M \propto \frac{1}{\lambda}(\frac{e}{p})^{1-\alpha}$ is the unit cost of production under professional management, and A is an equilibrium constant defined in the appendix. We assume that λ is large enough relative to e/p so professional management delivers a boost on net to revenue productivity.[11] These expressions clarify the trade-off made in hiring professional managers: firms benefit from a boost to productivity but have to pay for this in the form of a higher fixed cost of production. The equilibrium sorting pattern is characterized by two cutoffs φ^*

[10] The disamenity from professional management could also affect the variable costs of production, which would be subsumed in the relative productivity shifter between modes λ. So long as this variable disamenity is constant across regions within a country, the predictions of the model are unchanged.

[11] Formally, we assume that $\lambda > \alpha^{-\alpha}(1-\alpha)^{-(1-\alpha)}(e/p)^{1-\alpha}$

and φ_M^* such that (i) firms with $\varphi \in [1, \varphi^*)$ exit, (ii) firms with $\varphi \in [\varphi^*, \varphi_M^*)$ are family-managed and (iii) firms with $\varphi \in [\varphi_M^*, \infty)$ are professionally-managed. This pattern is depicted in Figure I.

The model is closed by free entry and labor market clearing conditions as shown in the Online Appendix. Importantly for our purposes, for any set of parameters there is an equilibrium pair of cutoffs φ^* and φ_M^* that define both sorting patterns and industry aggregates. These objects are affected by changes in contracting institutions p both directly (through the relative return to professional management) and indirectly (through general equilibrium effects channeled through wage changes driven by labor market clearing). We now turn to comparative statics of interest that we then test in the data. See Section D of the Online Appendix for proofs, in which we assume that the productivity distribution G is Pareto distributed with scale parameter θ.[12]

II.B. Empirical Predictions

Prediction 1. *An improvement in contractual institutions, i.e. $dp > 0$, reduces the productivity cutoff for professional management φ_M^* and raises the exit cutoff φ^*.*

There are two effects of improvements in institutions on the selection cutoffs. First, the reduction in the marginal cost of managers leads marginal firms to switch into professional management. This pushes the cutoff φ_M^* down. Second, the increase in demand for labor raises the wage and in turn raises the exit cutoff φ^*.[13]

Prediction 2. *The effect of changing institutions is more pronounced for intermediate sized firms.*

This immediately follows from the fact that, if $dp > 0$ causes a drop from φ_M^* to $\varphi_M^{*'}$, only firms with $\varphi \in [\varphi_M^{*'}, \varphi_M^*]$ switch management modes. The infra-marginal firms are either smaller or larger by comparison.

Prediction 3. *An improvement in contractual institutions has an ambiguous effect on the average size of both family-managed and professionally-managed firms. However, if the first-order effect dominates, then family-managed firms shrink and professionally-managed firms expand on average. Average firm size is unambiguously increasing in p.*

The ambiguity of the effect on firm size comes from the two counteracting effects along the extensive and intensive margins. For family firms, the upper cutoff falls while the lower cutoff rises, leaving the direction of the effect along the extensive margin ambiguous. Along the intensive margin, the equilibrium increase in the wage causes these firms to shrink. The net effect is ambiguous, but we show that for standard parameter values the two forces causing family firms to shrink dominate. For professionally-managed firms, average firm size falls along the extensive margin (marginal firms are less productive) but increases along the intensive margin (a lower marginal cost of production increases total employment by infra-marginal firms). When the productivity benefit of professional managers is high, the intensive effect on firm size dominates

[12] While not essential to our results, this simplifies the algebra and fits the size distribution of firms well (e.g. Chaney 2008).

[13] This general equilibrium force also attenuates the drop in φ_M^*, but intuitively the first order effect dominates under the Pareto distribution.

and average employment among professional managed firms rises. However, we show the net effect of all these forces unambiguously increases average firm size in the model.

Prediction 4. *In high-λ industries, (i) the selection cutoff for professional management φ_M^* is lower and (ii) an improvement in contractual institutions $dp > 0$ has less of an effect on the selection cutoff.*

The first part of this result is intuitive: in industries where professional managers are more beneficial, less productive firms are willing to pay the costs to adopt them. The second part is more nuanced, but the driving force is the selection of lower productivity marginal firms into professional management in high-λ industries. The effect on the cutoff which is determined by the indifference condition $\pi_M(\varphi_M^*) = \pi_F(\varphi_M^*)$. When contractual institutions improve, π_M rises and π_F falls so the cutoff has to fall until equality holds once more. Since (i) profits are convex in marginal costs and (ii) the marginal firm is less productive in high-λ industries, the impact of an improvement $dp > 0$ on profits is lower. Therefore, the reduction of the cutoff to restore indifference between modes is also lower.

Prediction 5. *An improvement in contractual institutions leads to an increase in aggregate productivity.*

There are two effects of improvements in contractual institutions on productivity. First, TFP rises along the extensive margin as (i) more firms use the more productive management mode and (ii) the least productive firms exit. Second, TFP rises along the intensive margin as firms using professional management use less to produce the same level of output.

Proposition 1. *Let X denote the level of variable X before a change in contractual institutions dp, X' denote its level after the change and $\hat{X} = X'/X$ denote the gross percentage change due to the change dp. Normalizing the ratio of fixed costs $\eta \equiv f_M/f$ so that $\eta - 1 = 1$, we have that*

$$\widehat{TFP} = \widehat{1 + \lambda_P}^{\nu} \tag{7}$$

where $\nu \equiv \frac{\theta+\sigma-1}{\theta(\sigma-1)}$ is a parameter that depends on the shape of the productivity distribution and the elasticity of substitution. That is, ν and the change in the share of professionally-managed firms λ_P is a sufficient statistic for the change in TFP.

Proposition 1 shows that the elasticity ν combined with the change in the share of professionally-managed firms is a sufficient statistic for the change in total factor productivity. Since professional management is a more productive technology at the firm-level, intuitively an economy with more firms using this mode is more productive. This result will be particularly useful in quantifying the effect of trust on TFP: once we estimate how changes in trust relate to changes in the share of professionally-managed firms, equation (7) provides a simple way to map this back into changes in aggregate productivity.

In our main analysis, we test these predictions using regional variation in trust within countries. It is of course possible that trust itself, or other unobservable correlated characteristics such as overall institutional quality, could drive differential managerial mode choices without affecting the relative cost of professional managers. For example, if better institutions increase overall the economic development that in turn increases demand for a firm's products, then these increased sales would lead more firms to be willing to pay

the fixed cost of professional management. We therefore control for regional GDP per capita and the college share of a region's population to capture these general equilibrium forces, and argue that residual variation in trust across regions, conditional on their level of development, should more precisely target differences in the differential cost to hiring professional managers relative to family ones.

III. DATA

Our data come from several sources.

III.A. Bureau van Dijk Amadeus

Firm-level data comes from Bureau van Dijk's (BvD) Amadeus dataset for 2011. This database collects standardized data from over 50 countries across Western Europe, Eastern Europe and Central Asia. The source for the data is generally the official company registrar office in each country, which requires all incorporated firms to submit annual company filings. The database includes standardized financial accounts data, although variable availability differs across countries. This database was also used by Bloom and Van Reenen (2007) as the sampling frame for the WMS and we will use this dataset to cross-check our classification of "family-owned family-managed" firms.[14] The region of each firm is also reported, although the granularity of this data varies by country. We query the Google Maps API to find a full set of regional identifiers that enable us to assign firms to regions reported in other datasets.[15]

Following Klapper, Laeven and Rajan (2006), we restrict our sample according to several criteria in order to ensure cross-country comparability. First, we include only private limited liability companies, since these firms are almost always required to file statements (coverage of other types of firms is uneven).[16] Second, we restrict our sample to manufacturing, retail and services industries. Third, we drop firms with less than 10 employees. This removes some of the cross-country variance regarding reporting requirements for small firms, and removes suspicious listings which may be holding companies rather than active firms. Finally, we drop firms with more than 5000 employees to trim outliers.[17] We relax these assumptions in robustness checks in Section V.C. to show that none of them drive our main results.

The unique attribute of the BvD dataset for our purposes is that it provides ownership and management information at the firm-level, compiled from the accounts data from official sources. Importantly, BvD harmonizes job title descriptions across countries to define managers as "individuals actively working for/in the company on a daily basis, who deal with current affairs on an executive point of view, but who do not necessarily sit at the table of the board of directors". This emphasis on defining managers as part of the active workforce of a company, rather than board members or directors for example, is crucial since it maps directly to the notion of management used in our model. Moreover, BvD manually matches country-

[14] We thank Daniela Scur for helping us link the firms in our dataset with those in the WMS.

[15] For example, in some countries only the city is reported which is much finer than the geography available in other datasets. By querying the list of cities in Google Maps, we retrieve the generic address for the city that includes the full list of regional identifiers (e.g. country, state, municipality and city).

[16] These account for 69% of firms in the database.

[17] This accounts for 0.14% of firms.

specific titles to their standardized roles to ensure that definitions are consistent across countries, and parses names into an English first name/last name format. Finally, BvD also provides a separate dataset providing information on the names and equity shares of owners.

III.B. Product Complexity

Following Levchenko (2007) we rely on US data on the number of intermediate products used in production across 4-digit manufacturing industries to proxy for product complexity. We let the dummy Complex_k equal one for industries above the median. A ranking of these industries is provided in Table A2 of the Online Appendix.

III.C. Contractual Institutions

To measure the quality of contracting institutions, we use (i) the Worldwide Governance Indicators rule of law index and (ii) a measure of trust from the World Value Survey (WVS).[18]

While the rule of law index provides a good measure of contractual institutions across countries, unfortunately no similar exists that covers our sample at the subnational level. We therefore use trust as a proxy at the region level. We believe this captures similar variation in the relative cost of hiring professional or family managers. This is because in our model contractual institutions determine the probability agents can get away with acting against the interests of the principle. Whether the principal trusts the manager or whether they are sure they can enforce against any shirking in the courts should therefore be highly correlated. Indeed, this variable has been widely used as a proxy for rule of law by various researchers (Knack and Keefer 1997, La Porta et al. 1997, Zak and Knack 2001). Our trust measure is the share of people within a region that choose the first option in response to the question "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?"[19]

To guage how reasonable the use of this proxy is empirically, Figure III explores the country-level relationship between trust and (i) the rule of law index and (ii) contracting enforcement (as measured in the World Bank Doing Business Survey). Trust is strongly correlated with both stronger rule of law and contract enforcement, providing reassurance that differences in trust across regions captures similar variation to legal institutions and the constraints faced by firm owners in delegating decision-making to managers which is emphasized in the model.

III.D. Regional Income and Human Capital Stock

To measure regional income and human capital we rely on data on regional GDP per capita and the share of workers with a college education from Gennaioli et al. (2012). We concord their region codes with those in the WVS and BvD datasets to produce a final set of consistent regional identifiers.

[18] We use data from six rounds of the WVS taken between 1981 and 2014.

[19] One concern is whether trust reported in the survey accurately reflects trust by those who make decisions about who manages the firm. As argued by Glaeser et al. (2000), experimental data has suggested that trust attitudes actually reveal trustworthiness, rather than just a belief that others can be trusted. This suggests trust in the WVS should reflect trust between individuals in a particular region, rather than abstract beliefs.

In sum, our primary dataset covers the 134 regions in 11 European countries where BvD, WVS and regional characteristics data are all available.[20]

IV. Measuring Family Management

To construct our measures of family management we extract from the Amadeus database (i) the full names of each manager, (ii) the full names of each owner and (iii) the equity share of each owner. We treat each unique surname as a family and match the surnames in the list of owners to those in the list of managers. This enables us to measure the ownership share of the company accounted for by each family in the list of managers. Our baseline measure defines a firm to be family-owned-family-managed (FOFM) if (i) all managers belong to one family and (ii) that family owns more than 20% of the firm.[21] However, in robustness checks we redo our main specifications using three alternative measures. The first uses a 40% equity cutoff for family owners. The second uses a continuous measure defined as the share of managers with the same last name as the largest shareholder with more than 20% equity. The third exploits the information on manager titles provided by BvD and defines a firm to be FOFM if the largest owner with more than 20% equity has a manager with a CEO-like string in their title.[22]

While our measure of family ownership is consistent with the previous literature, it is important to mention two main concerns to this method of classifying firms as FOFM. First, larger firms may have a greater propensity to use holding companies within ownership structures, which would lead to a spurious correlation between family management and firm size. We take a number of steps to address this concern. We start by exploiting the fact that BvD computes ultimate owners themselves using the network structure of the raw ownership data it acquires. So if Mr. Jones owns 100% of company A which owns 50% of company B, he will appear with a 50% ownership share of company B in our data. However, it is unlikely that BvD is able to catch the totality of indirect ownership. Therefore, we additionally match names of any company shareholders with those of individual shareholders to identify those set up in the same name as their owners (which is relatively common) and assign the ownership shares of those companies to the matched individuals. We also include two alternative specifications in our robustness checks. The first classifies firms as FOFM if using our baseline method but only computing ownership shares of the total firm ownership by individuals (i.e. we drop company shareholders). The second drops all firms with any company owners. The stability of our results across these alternative specifications reassures us that the observed relationship between firm size and family management is not mechanically produced by our measure. Moreover, our main specification examines the likelihood that a firm of a given size is family-owned as trust changes, which abstracts from these size-dependent measurement concerns.

[20] Our full dataset covers more than 265,000 firms, but not all countries have regions available that we were able to concord across all our datasets. Where regional variation is not exploited for identification, such as in the cross-country regressions, this full dataset is used. As shown in Table I, the 11 countries used in our primary dataset are Bulgaria, Bosnia and Herzogovina, Estonia, Finland, Germany, Italy, Netherlands, Poland, Spain, Switzerland and the Ukraine.

[21] The 20% equity definition is used in previous work classifying firms as family-owned, such as La Porta, Lopez-de-Silanes and Shleifer (1999). Importantly, a key difference between our measures and theirs is that we identify whether or not a firm that is family-owned is also family-managed.

[22] These vary by country and include titles such as “President”, “Director”, “Chief Executive” etc.

Second, it is easy to see how both type 1 and type 2 errors could introduce noise into our measure. We may over-predict the share of family firms in countries with a small group of very common surnames. Reporting requirements for the number of management staff may also differ across regulatory bodies. Our regional regressions, which rely on within-country variation in regional trust, difference out any such factors that vary at the country-level. Moreover, since this affects all firms equally and is unlikely to be correlated with measures of contracting institutions, we do not believe this influences our results beyond reducing the precision of our estimates.

Figure A1 and Table A1 in the Online Appendix correlate our measures of family-management with those in the World Management Surveys, that explicitly ask about family ownership and family management, for 1,349 firms which we were able to match to our dataset. The correlation between our measures reaches as high as 0.653 at the country-level and 0.433 at the firm-level. We find this high correlation at the country-level encouraging, given that our definition is likely to be noisy at the firm-level but should be well-positioned to capture changes in the relative share of family-managed firms across countries.

To further motivate our empirical analysis, Figure II provides an overview of the relationship between the share of family firms, and GDP per capita as well as our three proxies of contractual institutions across countries. These correlations confirm that poorer countries, and countries with weaker contracting institutions, are characterized by a higher prevalence of family firms.

Finally, Table I summarizes the main moments of the cross-country data for our final sample.

V. RESULTS

V.A. Cross-Country

Management Mode Choice. In order to test Prediction 1, that improvements in contractual institutions decrease the probability of being FOFM, we run

$$FOFM_{ick} = \alpha \ln L_{ick} + \beta \text{Rule of Law}_c + \gamma' X_{ic} + \delta_k + \varepsilon_{ick}, \tag{8}$$

where $FOFM_{ick}$ is a dummy for whether firm i in country c and industry k is family-owned-family-managed, L_{ick} is firm employment as reported in BvD Amadeus and Rule of Law$_c$ is the WGI rule of law index (measured in standard deviations). The control vector X_{ic} includes the logarithm of GDP per capita and the logarithm of firm age, and δ_k are 4-digit industry fixed effects. Standard errors are clustered at the country-level.

Columns (1) and (2) in Table II show that an improvement in contractual institutions is associated with a reduction in the probability of being family-managed - a 1 standard deviation increase in the rule of law index is associated with a 16.3% drop in the probability a firm is family-managed.

To test Prediction 2, that the effect of improving institutions on management mode is attenuated for large firms, we extend specification (8) by adding an interaction term between rule of law and firm size. Column (3) reports the result. The interaction term is positive confirming that the effect of contractual institutions on the management mode decision is attenuated for large firms.

Relative Firm Size. To test Prediction 3, that family-managed firms are relatively smaller as contractual institutions improve, we run the following regression

$$\ln L_{ick} = \alpha FOFM_{ick} + \beta \text{Rule of Law}_c + \gamma FOFM_{ick} \cdot \text{Rule of Law}_c + \gamma' X_{ic} + \delta_k + \varepsilon_{ick}. \quad (9)$$

The key parameter of interest is γ, which our model predicts will be negative. Columns (4) and (5) of Table II show that family-managed firms are about 37% smaller than their professionally-managed counterparts. This is also reflected in the first three columns, where a 10% increase in firm size is associated with around a 1% reduction in the probability that firm is family-managed. Column (6) estimates the interaction term in the regression above, and confirms that family-managed firms tend to be relatively smaller in contexts where contractual institutions are stronger.

V.B. Within-Country

We now exploit variation in our regional proxy for contractual institutions - trust, as measured in the WVS - to more carefully test the predictions of the model in our primary dataset spanning 134 regions in 11 countries. As discussed in Section III.C., trust correlates with measures of rule of law and contracting enforcement at the country-level, motivating our use of it as a proxy for contractual institutions.

While our results should be interpreted as associations consistent with the model rather than causal relationships, our data allow us to control for country-level unobservables and region characteristics (such as GDP per capita and the share of college-educated workers) when examining patterns of trust and firm behavior. We show that failing to account for these differences would lead us to substantially overestimate the effect of trust on management modes. Nevertheless, these relationships we previously documented at the country-level still exist once we purge the data of these sources of endogeneity.

Management Mode Choice. We begin by testing Prediction 1, that an improvement in contractual institutions is correlated with a decrease the probability of being family-managed, conditional on firm size, by running the following regression

$$FOFM_{irkc} = \alpha \ln L_{irck} + \beta Trust_{rc} + \eta' X_{irc} + \delta_k + \gamma_c + \varepsilon_{irck}. \quad (10)$$

Here i indexes firms, r indexes regions, c indexes countries and k indexes 3-digit industries. β is identified off variation in trust and management modes across regions within countries for firms of the same size. The vector of controls X_{irc} contains a region's GDP per capita and share of workers with a college education, as well as firm age. To strengthen confidence in our results and confirm the mechanisms at play we extend our baseline regression to test for differential mode choices in complex industries (Prediction 5.i) as well as differential response of large firms and firms in more complex industries to changes in trust (Predictions 2 and 5.ii).

Columns (1) to (4) in Table III show that, consistent with Proposition 1, an increase in trust is associated with a reduction in the probability of a firm being family-managed. Columns (1) and (2) highlight

the benefit of our approach using regional variation: using variation in trust across countries would lead us to overestimate its effect on family management by about 50%. The direction of the bias is intuitive, since countries with higher trust (our proxy for better contractual institutions) are likely to have other unobservables associated with positive economic conditions that also increase the relative return to professional management.[23]

Focusing the results using within-country variation in trust and controlling for region characteristics, column (4) suggests that a unit standard deviation increase (0.134) in trust is associated with a 2.2% reduction (0.134×0.161) in the probability of being family-managed conditional on firm size. Column (5) confirms that firms in more complex industries are roughly 2% less likely to be family-managed (conditional on firm size and regional trust), supporting our hypothesis that the returns to professional management in these industries should be higher. Further, columns (6) and (7) provide consistent evidence that the response of firms to changes in contractual institutions is weaker within more complex industries and for larger firms.

Additionally, as a sort of placebo test we examine whether regional trust has less of an effect on managerial mode choices in countries characterized by high rule of law. Trust should capture much less meaningful variation in the relative cost of professional management in these countries. Column (8) in Table III shows that the effect of trust is highly heterogeneous across high and low rule of law countries. Within low rule of law countries, a unit standard deviation increase in regional trust is associated with a 3.8% reduction in the probability of being family-managed (0.134×0.283). By contrast, the effect is statistically indistinguishable from zero in high rule of law countries.

Firm Size. In order to assess the relationship between regional trust and relative firm-size of family vs professionally-managed firms (Prediction 3), we estimate the following regression

$$\ln L_{irck} = \alpha FOFM_{irkc} + \beta Trust_{rc} + \gamma FOFM_{irkc} \cdot Trust_{rc} + \eta' X_{irc} + \delta_k + \gamma_c + \varepsilon_{irck}. \qquad (11)$$

Table IV shows the results. In column (2) we see that family-managed firms are about 39% smaller than professionally-managed firms, once again mirroring the negative coefficient on firm size in the previous table. Column (3) then runs the full regression above. The interaction term is negative, showing that in regions with a higher level of trust family-managed firms are much smaller relative to professionally-managed firms. This confirms our model's prediction.

We provide additional evidence in support of the mechanisms at play by testing for heterogeneous effects along two dimensions. First, in column (4) we test whether the effect of trust on the relative size of family-managed firms is different in more complex industries. The point estimate suggests that the difference in size between family and professionally-managed firms is less sensitive to changes in trust in more complex industries, but this result is quite noisy. Second, as before we perform a sort of placebo test to examine whether changes in regional trust have less bite on relative firm size in high rule of law countries. Column (5) shows that the previous result disappears in countries with a high rule of law. This confirms that when a country is characterized by strong rule of law, regional trust does not appear to capture much

[23]For example, higher economic growth may increase the benefit from hiring outside managers if firms anticipate that professional managers will allow them to expand in the future.

variation associated with the relative costs and benefits to using family management.

Aggregate Productivity and Regional Trust. Next, we test Prediction 4, that an increase in trust is associated with an increase in aggregate productivity. We begin by examining whether trust increases the correlation between size and productivity through the following specification

$$\ln L_{irkc} = \alpha Trust_{rc} + \beta \ln TFPQ_{irkc} + \gamma \ln TFPQ_{irkc} \times Trust_{rc} + \eta' X_{irc} + \delta_k + \gamma_c + \varepsilon_{irck}. \quad (12)$$

We use TFPQ (as defined in Hsieh and Klenow 2009) as a measure of productivity[24], but note that this has a high correlation of 0.9 with unadjusted TFPR.

Table V presents the results. Column (1) shows that family-managed firms are 24.8% less productive than their professionally-managed counterparts. Column (2) shows that firm size is more responsive to TFPQ in regions where trust is higher. In particular, a 10% increase in TFPQ is associated with a 3.3% increase in firm size (0.357×0.466 + 0.163) for a region with the average level of regional trust, but this rises to a 3.9% increase (0.491×0.466 + 0.163) in a region one standard deviation above the average. Increasing trust by one standard deviation within a country therefore increases the response of firm size to TFPQ by 18.2% (3.9/3.3 - 1). This suggests that trust increases aggregate productivity by improving the allocation of labor across firms.

Finally, we use the sufficient statistic result of Proposition 1 to quantify the effect of trust on TFP via the mode choice channel highlighted in this paper. Recall that Proposition 1 relates changes in the share of professionally-managed firms to changes in TFP with an elasticity $\nu \equiv \frac{\theta+\sigma-1}{\theta(\sigma-1)}$. This motivates the following two-step method to map changes in trust to changes in TFP. First, we relate changes in regional trust to changes in the share of professionally-managed firms through the iso-elastic relationship $1 + \lambda_P = \alpha\,(1 + \text{Trust})^{\beta}$. We estimate the elasticity β via OLS. Second, we combine this with the result in Proposition 1 to compute changes in TFP resulting from a change in trust as $\widehat{TFP} = \widehat{1 + \text{Trust}}^{\beta\nu}$, where $\widehat{1 + \text{Trust}}$ is a gross percentage change in $1 + \text{Trust}$. We also perform the same decomposition using the rule of law index at the country-level, where we posit a semi-elastic relationship of the form $1 + \lambda_P = \exp(\tilde{\beta}\widetilde{\text{Rule of Law}})$ since our rule of law measure takes values less than zero. To obtain a value for ν, we calibrate σ and θ to existing values from the literature and provide results for a range of parameters. In particular, based on the evidence on the firm size distribution cited in Chaney (2008) we use values of θ, σ that match the sales-rank slope of 2. Since this only identifies the ratio, we provide TFP statistics for a range of θ values and compute the σ consistent with this sales-rank slope.[25]

Table VI provides estimates of the elasticity β. Consistent with our prior results, we provide results for the full sample as well as separate elasticities for low and high rule of law countries. Column (1) shows that a 10% increase in 1+Trust is associated with a 3.7% increase in $1 + \lambda_P$. However, columns (2) and (3) show significant heterogeneity across countries with a 4.9% (1.7%) effect in low (high) rule of law countries.

[24] We use a capital share of $\alpha = 0.3$, and calculate $TFPQ \propto (PY)^{\frac{\sigma}{\sigma-1}}/K^{\alpha}(wL)^{1-\alpha}$. All values are in 2012 dollars. See Hsieh and Klenow for a derivation of TFPQ, we use a conservative $\sigma = 3$ as in their paper.

[25] In particular, this model predicts that the sales-rank slope is given by $\frac{1+\theta}{\sigma}$, so for any θ there is a unique σ that matches the sales-rank slope of 2.

Column (4) shows that, at the country-level, a unit standard deviation increase in the rule of law index is also positively associated with the share of professionally-managed firms.

Table VII provides estimates of the effect of trust on TFP across two counterfactual experiments, combining our estimates of β with a variety of ν values calibrated to match to sales-rank slope as discussed above. In particular, we use as our baseline measure the median value of $\theta = 4$ from the trade literature but consider $\theta = 2$ and $\theta = 6$ also. The first experiment evaluates the effect of increasing regional trust by one standard deviation from its average value. On average, this increases TFP by 2.68% using our baseline value of θ. However, this effect is much larger in low rule of law countries (3.52%) compared to those with a high rule of law (1.23%). The second experiment considers the effect of moving from the minimum value for regional trust (0.154) to the maximum (0.674). The average effect of this change on TFP is 11% across all countries, 14.65% in low rule of law countries and 4.94% in high rule of law countries. These results suggest that improving trust has a quantitatively important effect on TFP through the channel highlighted in our model, and that this is effect is especially important in countries with weak institutions. Finally, we consider the effect of increasing the rule of law index by one standard deviation (experiment 3) as well as the effect of moving from the minimum to the maximum level of the rule of law index in our dataset (experiment 4). In our sample, this corresponds to going from Russia to Norway. Once again, we see sizable effects on TFP, with a unit standard deviation increase in rule of law being associated with a 7.9% increase in TFP, while moving from a Russia to Norway's level of governance increases TFP by 21.6%.

Additional Evidence. Our data also allows us to disentangle whether the weaker performance of family firms is driven by family ownership or management. Though Bloom and Van Reenen (2007) document a correlation between family ownership and weaker management practice, Bertrand and Schoar (2006) summarize a long strand o literature dating at least to Berle and Mean (1932) arguing that family ownership can be more efficient that other modes of ownership. For example, family owners may be more likely to take decisions in the best long-term interest of the company. Further, Spieler and Murray (2009) argue that there is academic consensus around a life cycle view where having owner control is most critical in the early period, but then the founder may prove too risk averse in later periods. Consistent with these dynamic concerns, there is agreement that succession is a central problem and that, as the Economist stresses, "Family businesses that restrict their choice of heirs to their children can be left with dunces."[26] Indeed, Bloom and Van Reenen (2007) show that inherited family-owned firms who appoint a family member (especially the eldest son) as chief executive officer are very badly-managed on average.

These literatures raise the question of whether the negative correlation between family ownership/management and management quality is a question of family ownership per se or of succession. This is particularly important since several papers Bennedsen et. al. (2007) and Lemos and Scur (2018) have used the availability of a male son as an instrument for family management. The latter collect a new detailed dataset of the succession history in terms of ownership (who owns the shares) as well as control (who is the CEO) for over 800 firms in Latin America, Africa and Europe and find that family-owned-and-controlled firms are worse managed and argue that the negative link seems to stem from the family vs non-family control rather than

[26]The Economist, "Family companies: To have and to hold", April 18th 2015.

simply family or non-family ownership. However, in both cases, while the instrument may be resolving some of the endogeneity in firm organizational structure - do badly managed firms for instance choose family management - it does not allow the authors to separately identify the effects of primogenitor succession from family management itself.

We run two exercises here. We start by comparing family-owned-family-managed firms with those that are family-owned but professionally-managed (FOPM). We define the latter as firms which are owned by one family (according to our baseline measure) but are not managed by that family. Table VIII column (1) shows that family-owned-family-managed are about 17% smaller than family-owned-professionally-managed, while columns (2) and (3) show that they are roughly 7-12% less productive. This suggests family-managed firms perform worse than externally-managed firms, even if the latter are family-owned. However, the second row of these results shows that family-owned-professionally-managed firms are still about 49% smaller and about 23-40% less productive than externally-owned-professionally-managed firms, that (i.e. professionally-managed firms in which no individual owner owns more than 20% equity). This would suggest that family-owned firms perform substantially worse than externally-owned firms. However in columns (4)-(6) we compare family-owned-professionally-managed firms with a particular subset of externally-owned firms, those owned by individuals (as opposed to those (partially) owned by companies). Column (4) shows that the difference in average size between family-owned-professionally-managed and non-family firms drops to 14% when we consider this subsample, while columns (5) and (6) show that the difference in TFP between these firms falls to 5-11%. Moreover, in Table XIII of our robustness checks we repeat these regressions in columns (1)-(6) using a stricter 40% equity cutoff for defining ownership and see that both the size and TFP differences between family-owned-professionally-managed and non-family firms go to zero (see discussion in the next section). We interpret these results as reflecting a similar sorting pattern to the one highlighted in the model, whereby the most productive firms are bought out by a dispersed group of shareholders while intermediate- and less-productive firms remain owned by one primary group of individuals. So while our data tells that overall family-owned-professionally-managed firms are worse performing than those which externally-owned, once we compare them with intermediate non-family firms which are owned by individuals rather than companies these differences disappear.

In our second exercise, we examine how outcomes between family- and professionally-managed firms vary with firm age to assess the life cycle view articulated above. Our assumption here is that young, family-managed firms are likely to be managed by the founder while it is for older family-managed firms that firm performance as primogeniture kicks in. Table IX columns (1) and (2) show that the difference in TFP between family- and professionally-managed firms is greater for old firms. That said, the first row shows that a substantial discounts exists even in the first years, pointing to the inferiority of founder control as well. However, as before his difference at birth disappears once we consider only firms which are owned by individuals: TFP is only 4-8% lower for these firms in columns (3) and (4). These findings becomes slightly noisier in columns (7)-(10) of Table XIII in our robustness checks when using the 40% equity cutoff for the definition of firm ownership, but the sign of the coefficients is the same throughout. Taken together, we interpret these findings as confirming the role played by primogeniture in reducing firm performance.

V.C. Robustness

In this section, we assess the robustness of our results. We first examine the sensitivity of all our results to alternative methods of classifying firms as family-owned-family-managed. We then evaluate the sensitivity of our main results to a number of alternative sample definitions and measures of firm size.

Measurement of Family Firms. To begin, we check the robustness of our results to 5 alternative methods of classifying firms as family-owned-family-managed. In specification 1, a firm is defined as FOFM if one family is listed under management and that last name owns at least 20% equity held by individual (rather than both individual and company) shareholders. In specification 2, the FOFM definition is analogous to that in the main specifications, but only firms without any company listed as a shareholder are included. In specification 3, the FOFM definition is analogous to that in the main specifications but with a 40% equity cutoff for ownership (rather than 20%). In specification 4, FOFM is a continuous measure defined as the share of managers with the same last name as the largest shareholder with more than 20% equity. In specification 5, a firm is defined as FOFM if the largest owner with more than 20% equity has a manager with a CEO-like string in their title.

Table X checks the robustness of the baseline relationship between trust and FOFM across these 5 additional specifications. In columns (1) to (5), we see that for every alternative measure larger firms are less likely to be family-managed and that firms of a given size are less likely to be family-managed in regions with high trust. In columns (6) to (10), for three out five measures the effect of trust on managerial mode choice is attenuated for large firms. The remaining two are insignificantly different from zero.

Table XI checks the robustness of the heterogeneous effects of trust to mode choices across industry complexity and high rule of law countries. Columns (1) to (5) show that for each of our alternative measures, firms in more complex industries are less likely to be family-managed (conditional on firm size and regional trust). Columns (6) to (10) show that, as in our main specification, the effect of trust on mode choice is attenuated in complex industries for four out of five of these alternative measures. Finally, columns (11) to (15) show that the muted effects of trust in high rule of law countries is confirmed in three of these cases.

Table XII checks the robustness of the relationship between relative firm size of family- and professionally-managed firms and regional trust. Columns (1) to (5) show that the difference in relative size of professionally- and family-managed firms is increasing in regional trust for four out of five of these new measures. Columns (6) - (10) test whether this effect is heterogeneous across complex industries. Recalling that the point estimate was positive but insignificant in our main specification, the results here deliver the same implications with all coefficients being positive while only one is significant. Lastly, columns (11) to (15) show that the effect of trust on the gap in relative firm size is attenuated in high rule of law countries for each of our alternative measures.

Table XIII repeats the specifications of Tables VIII and IX for a different definition of family ownership using a 40% cutoff for firm ownership in the same way as specification 3 of the previous tables. Columns (1)-(6) repeat Table VIII exploring the differences between family-managed and family-owned-professionally-managed firms for the two subsamples including all firms and only those owned by individuals. Columns (7)-(10) repeat Table IX exploring how differences between family- and professionally-managed firms vary

over the life cycle, again repeated for both subsamples. As discussed in the previous section, the results are broadly robust to this alternate definition.

Taken together, Tables X, XI and XII support our belief that none of these main results are being driven by any particulars of our baseline measure of family management.

Including Alternative Legal Forms of Firm Registration. Our baseline sample includes only private limited liability companies. These account for a large majority of 68.8% of firms in our sample, with the remainder comprising of joint stock companies (12.7%), limited liability partnerships (4.2%), sole propiertarships (4.1%), public companies (1.4%), general partnerships (0.13%) and other (8.7%). In Table XIV, we assess how our main results change when we consider all legal forms. In column (2), we see the relationship between employment, trust and family management is robust to including all legal firms (compared to the baseline result repeated in column 1). In column (8), we find the management mode decisions of large firms are less affected by trust for this alternative sample in the same way as in the baseline specification (repeated in column 7).

Including Alternative Size Cutoffs. Our baseline sample includes firms with more than 10 employees, which we prefer since the coverage for smaller firms is inconsistent across countries in the BvD database.[27] One question is whether our results wash out once we consider the full sample of firm sizes. In columns (3) and (9) of Table XIV we repeat our two main specifications without applying this firm size cutoff. Our results are statistically and economically unchanged in this wider sample.

An additional concern is whether we incorrectly measure the location of multi-plant establishments. For example, a multi-plant establishment in the US might produce across many locations but register in Delaware. The level of trust in Delaware would therefore be an inaccurate measure of the level of trust between the firm and its managers where it operates. Unfortunately, our firm-level dataset does not permit us to observe the location of firms' plants and address this issue directly. Instead, we take an indirect route and restrict the sample to a group of smaller firms who are much more likely to be single-plant establishments. For these firms, the location of registration should be the same as where production occurs. Columns (4) and (10) consider firms with between 10 and 250 employees. While this approach to deal with multi-plant firms is imperfect, the stability of our estimates across this restricted sample suggests this unlikely to have too much of an effect on our results.

Lastly, to match the sample used by the World Management Survey, columns (5) and (11) use a minimum size cutoff of 50 employees. The results are qualitatively unchanged.

Alternative Measure of Firm Size. In the model, firms differ in a single attribute (productivity). Since there is only one input (labor), this is perfectly correlated with productivity under our assumption of common input prices and motivates our use of firm employment to proxy heterogeneity across firms. There are, of course, other ways to measure firm size, the most common of which is capital or assets. Our framework can easily be extended to a Cobb-Douglas technology over labor and capital. Intuitively since there

[27] We also drop firms with more than 5000 employees to trim outliers. These constitute 0.01% of observations in our sample.

is only one dimension of heterogeneity across firms (productivity), both inputs will be perfectly correlated with productivity in this extension. This motivates an alternative specification where we use capital (defined as assets reported by the firm in the BvD dataset) to measure firm size in columns (6) and (12). The trust coefficient remains significant, and the interaction term just evades statistical significance with a p-value of 0.15. Taken together, this suggests our results are broadly robust to this alternative definition of firm size.

Historical Political Institutions as a Driver of Trust. Our baseline specifications include controls that attempt to capture unobservables that drive both firm behavior and trust, but we do not argue that variation in trust is truly exogenous. Rather, our empirics should be viewed as associations consistent with the model's multiple predictions and thus support its narrative that legal institutions lower aggregate performance by causing more firms to sort into less productive family management. However, Tabellini (2010) argues that differences in historical institutions can provide exogenous variation in culture (one dimension of which is trust). The intuition is that cultural traditions are inherited from earlier generations, and weak political institutions can affect culture. Once we control for the direct effect of early institutions on contemporaneous outcomes,[28] he argues, the residual variation provides exogenous differences in culture today. The variable capturing early political institutions comes from his paper, and is the first principal component of five variables measuring "institutionalized constraints on the decision making powers of chief executives" in 1600, 1700, 1750, 1800, and 1850 from Acemoglu et. al. (2002).

While Tabellini (2010) finds a strong first stage relationship between early institutions and his measure of culture (F-stat: 12.71), he finds a much weaker positive relationship with trust (F-stat: 4.84). We have a smaller sample of 38 regions which we concord between our two datasets, and find a similarly low first-stage relationship which renders our IV estimates insignificant. Instead, we show the reduced form relationship between early political institutions and family management (conditional on our baseline and historical controls) in our main specifications.

Column (1) of Table XV shows that firms in regions with weaker institutions are less likely to be family-managed, while column (2) shows that this difference is attenuated for large firms. While we do not want to argue this measure is uncorrelated with any unobserved factors driving firm behavior in this paper, we believe this provides one more piece of evidence that the patterns we document in the data are not simply spurious.

Using Within-Region Variation for Interaction Results. Our baseline specifications use country fixed effects to identify the effect of differences in trust across regions within countries on firm behavior. However, for certain specifications where the coefficient of interest is an interaction of trust with other variables it is possible to include region fixed effects to use an even finer source of variation for identification (for example, comparing the effect of trust on management choices for small and large firms within a region). Table A3 in the online appendix reproduces our four main interaction specifications where this is possible. In most cases, the results are qualitatively unchanged when using this finer source of within-region variation for identification.

[28] The author uses urbanization rate in 1850 and school enrollment in 1960, which we include in our specifications.

VI. Conclusion

The existing literature points, on one side, to evidence of successfully family-managed firms and the benefits that this management mode entails (Bertrand 2009). At the same time, it also provides evidence linking family management to worse performance and organizational structures (Bertrand and Schoar 2006, Bloom and Van Reenen 2005).

This paper contributes to this debate by providing novel evidence about how firm decisions to be family- or professionally-managed are influenced by the external contracting environment, and how these choices influence both firm and aggregate productivity. We thus provide evidence for a specific channel through which institutions influence TFP. Using a unique dataset we created containing the managerial mode choices for over 119,000 firms across 134 regions in 11 countries, we offer a more systematic and comprehensive view of the incidence of family management and ownership than previously possible and establish a set of new stylized facts concerning the sorting of firms across management modes according to firm, industry, regional and national characteristics. Our empirical analysis is guided by a simple model of an industry equilibrium that highlights how a weak contracting environment discourages the delegation of managerial tasks to outside professionals which in turn, due to span-of-control limitations, inhibits entrepreneurs from expanding to their optimal size. Hence, when contracting institutions are weak, allocative efficiency falls as productive firms remain suboptimally small and lower competition allows some inefficient firms to survive.

Consistent with the prediction of this model, our empirical results suggest that stronger rule of law and better contractual institutions are associated with reductions in the incidence of family firms. Within countries, we find that in regions with weaker levels of trust, firms are more likely to be family-managed and family-managed firms are likely to be relatively larger in line with the sorting patterns predicted by our model. These patterns are stronger in more complex industries that seem especially sensitive to contracting security. Further, we are able to break apart ownership from management and find that not all types of family ownership are equal: overall it appears that it is family management rather than family ownership that is detrimental to firm performance. Finally, in terms of economic significance, we show that the magnitude of these effects on productivity can be quite large, suggesting the salience of this issue to the ongoing growth debate.

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TABLES

Table I: Data Summary

Country	N	Median L	Mean L	Share FM
Austria	7340	25	74.39	0.47
Bosnia and Herzegovina*	1108	33	72.13	0.56
Bulgaria*	10013	20	44.67	0.56
Czech Republic*	12313	23	72.06	0.30
Estonia*	1781	17	32.55	0.32
France	15651	30	94.28	0.13
Germany*	17662	79	187.08	0.15
Italy*	35950	18	29.56	0.36
Latvia	2100	18	41.86	0.17
Lithuania	1400	47	102.49	0.16
Netherlands*	18025	20	41.30	0.18
Poland*	2474	100	195.29	0.16
Portugal	901	24	72.52	0.26
Russian Federation	90352	26	47.87	0.48
Serbia	1182	71	147.49	0.32
Slovenia	1747	23	66.99	0.35
Spain*	22008	19	48.95	0.29
Switzerland*	9117	27	76.71	0.20
Ukraine*	4101	50	117.05	0.10

Note: * indicate countries with regional trust data.

Table II: Cross-Country Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent	FOFM	FOFM	FOFM	$\ln L$	$\ln L$	$\ln L$
$\ln L$	-0.096***	-0.092***	-0.096***			
	(0.0055)	(0.0042)	(0.0053)			
$\widetilde{\text{Rule of Law}}$	-0.157***	-0.163***	-0.207***	-0.056	0.092	0.180
	(0.0185)	(0.0301)	(0.0415)	(0.0614)	(0.1240)	(0.1512)
$\widetilde{\text{Rule of Law}} \times \ln L$			0.013*			
			(0.0072)			
FOFM				-0.392***	-0.370***	-0.394***
				(0.0736)	(0.0667)	(0.0607)
FOFM$\times\widetilde{\text{Rule of Law}}$						-0.192**
						(0.0780)
Controls		X	X		X	X
Clustering	Country	Country	Country	Country	Country	Country
No. Clusters	21	21	21	21	21	21
R^2	0.20	0.20	0.20	0.12	0.15	0.16
N	271249	265509	265509	271249	265509	265509

Note: Controls include log GDP per capita, log firm age and 4 digit SIC dummies. $\widetilde{\text{Rule of Law}}$ is the rule of law index, standardized to have mean zero and unit standard deviation.

Table III: Probability of being FOFM and Regional Trust

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	FOFM	FOFM	FOFM	FOFM	FOFM	FOFM	FOFM	FOFM
Trust	-0.665***	-0.382***	-0.359***	-0.161**	-0.203***	-0.225***	-0.534***	-0.283***
	(0.1732)	(0.0951)	(0.0987)	(0.0661)	(0.0690)	(0.0687)	(0.1054)	(0.1037)
$\ln L$			-0.100***	-0.098***	-0.105***	-0.100***	-0.139***	-0.098***
			(0.0034)	(0.0033)	(0.0039)	(0.0039)	(0.0088)	(0.0033)
Trust$\times \ln L$							0.107***	
							(0.0215)	
Complex					-0.017**			
					(0.0079)			
Complex$\times$Trust						0.086**		
						(0.0374)		
HighRol$\times$Trust								0.259**
								(0.1290)
Controls				X	X	X	X	X
Country FE		X	X	X	X	X	X	X
Clustering	Country	Region	Region	Region	Region	Region	Region	Region
No. Clusters	11	134	134	133	133	133	133	133
R^2	0.09	0.14	0.18	0.16	0.16	0.19	0.16	0.16
N	119477	119477	119477	112954	41778	41778	112954	112954

Note: All specifications include 3 digit SIC effects. Controls include log firm age, log region gdp per capita and the region's college share of residents. (5) excludes industry fes. Complex is complexity measure defined in text. HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland.

Table IV: Firm Size, Management Mode and Regional Trust

	(1)	(2)	(3)	(4)	(5)
Dependent	$\ln L$	$\ln L$	$\ln L$	$\ln L$	$\ln L$
Trust	0.236*	0.047	0.197	0.454***	-0.044
	(0.1428)	(0.1259)	(0.1332)	(0.1421)	(0.3242)
FOFM		-0.392***	-0.214***	-0.002	-0.338**
		(0.0404)	(0.0779)	(0.0914)	(0.1172)
Trust×FOFM			-0.506**	-1.074***	0.183
			(0.2212)	(0.2741)	(0.4220)
Complex×FOFM				-0.114**	
				(0.0573)	
Complex×Trust				-0.210**	
				(0.0947)	
HighRol×FOFM					-1.522***
					(0.2405)
HighRol×Trust					-0.341
					(0.3605)
Trust×FOFM×Complex				0.218	
				(0.1476)	
Trust×FOFM×HighRol					2.178***
					(0.5490)
Controls		X	X	X	X
Clustering	Region	Region	Region	Region	Region
No. Clusters	134	133	133	133	133
R^2	0.28	0.33	0.33	0.38	0.33
N	119477	112954	112954	41778	112954

Note: All specifications include 3 digit SIC and country fixed effects. Controls include log firm age, log region gdp per capita and the region's college share of residents. Complex is complexity measure defined in text. HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland.

Table V: Aggregate Productivity, Management Mode and Regional Trust

	(1)	(2)
Dependent	$\ln TFPQ$	$\ln L$
FOFM	-0.248***	
	(0.0319)	
Trust		-4.122**
		(1.8913)
lnTFPQ		0.163**
		(0.0636)
Trust×lnTFPQ		0.466**
		(0.2026)
Controls	X	X
Clustering	Region	Region
No. Clusters	116	116
R^2	0.35	0.46
N	73066	73066

Note: All specifications include 3 digit SIC and country fixed effects. Controls include log firm age, log region gdp per capita and the region's college share of residents. Complex is complexity measure defined in text. HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland.

Table VI: Effect of Trust and Rule of Law on Productivity Sufficient Statistic

Dependent: $\ln(1+\lambda_P)$	(1)	(2)	(3)	(4)
$\ln(1+\text{Trust})$	0.374^{***}	0.490^{***}	0.173^{**}	
	(0.0899)	(0.1308)	(0.0691)	
$\widetilde{\text{Rule of Law}}$				0.101^{***}
				(0.0132)
Country FE	X	X	X	
Industry FE	X	X	X	X
Sample	All	Low Rule of Law	High Rule of Law	All
Clustering	Region	Region	Region	Country
No. Clusters	134	85	49	21
R^2	0.14	0.10	0.07	0.17
N	119475	75537	43935	265509

Note: The high rule of law sample includes Germany, Netherlands, Finland and Switzerland. The low rule of law includes Bulgaria, Bosnia and Herzogovina, Estonia, Italy, Poland, Spain and Ukraine. $\widetilde{\text{Rule of Law}}$ is the rule of law index, standardized to have mean zero and unit standard deviation.

Table VII: Counterfactual Effects of Trust on TFP

	Exp. 1: 1 SD Increase in Regional Trust			Exp.2: Increase from Min to Max Regional Trust			Exp. 3: 1 SD Increase in RoL	Exp. 4: Increase from Min to Max RoL
Countries	All	Low RoL	High RoL	All	Low RoL	High RoL	All	All
$\theta = 2$	5.42%	7.16%	2.47%	23.23%	31.44%	10.13%	16.36%	47.87%
$\theta = 4$	2.68%	3.52%	1.23%	11.01%	14.65%	4.94%	7.87%	21.60%
$\theta = 6$	1.78%	2.33%	0.82%	7.21%	9.54%	3.27%	5.18%	13.93%

Note: HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland. Experiment 1 computes the change in TFP from increasing trust by 1 SD (0.134) from it's overall average of 0.357. Experiment 2 computes the change in TFP from increasing trust from the regional minimum 0.153 to the regional maximum 0.673. Experiment 3 computes the change in TFP from a 1SD increase in the rule of law index across countries. Experiment 4 computes the change in TFP from increasing the rule of law index from the minimum (Russia) to the maximum (Norway) in our sample.

Table VIII: Additional Checks: Family-Ownership and Family-Management Comparison

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent	$\ln L$	$\ln TFPQ$	$\ln TFPQ$	$\ln L$	$\ln TFPQ$	$\ln TFPQ$
FOFM	-0.661***	-0.524***	-0.295***	-0.355***	-0.242***	-0.130***
	(0.0070)	(0.0102)	(0.0100)	(0.0261)	(0.0288)	(0.0268)
FOPM	-0.490***	-0.408***	-0.231***	-0.144***	-0.110***	-0.049*
	(0.0075)	(0.0098)	(0.0094)	(0.0262)	(0.0287)	(0.0267)
Sample	All	All	All	Ind	Ind	Ind
Firm Size Control			X			X
Country FE	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X
Country Controls	X	X	X	X	X	X
Firm Controls	X	X	X	X	X	X
R^2	0.35	0.37	0.43	0.24	0.35	0.39
N	112952	73062	73062	61227	50013	50013

Note: All specifications include 3 digit SIC and country fixed effects. Robust standard errors reported in parentheses. Country controls include regional log GDP and college share. Firm controls include log age. All sample includes all firms, Ind sample excludes firms which are (partially) owned by companies rather than individuals.

Table IX: Additional Checks: Founder-Managed and Family-Managed Comparison

	(1)	(2)	(3)	(4)
Dependent	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$
FOFM	-0.201***	-0.055***	-0.078***	-0.042**
	(0.0269)	(0.0258)	(0.0314)	(0.0307)
ln Age	-0.085***	-0.115***	-0.071***	-0.115***
	(0.0063)	(0.0058)	(0.0084)	(0.0081)
FOFM× ln Age	-0.018*	-0.029**	-0.022*	-0.015
	(0.0097)	(0.0092)	(0.0112)	(0.0109)
Sample	All	All	Ind	Ind
Firm Size Control		X		X
Country FE	X	X	X	X
Industry FE	X	X	X	X
Country Controls	X	X	X	X
Firm Controls	X	X	X	X
R^2	0.35	0.43	0.35	0.39
N	73062	73062	50013	50013

Note: All specifications include 3 digit SIC and country fixed effects. Robust standard errors reported in parentheses. Country controls include regional log GDP and college share. Firm controls include log age. All sample includes all firms, Ind sample excludes firms which are (partially) owned by companies rather than individuals.

Table X: Robustness I: Trust and Managerial Mode Choice

Dependent: FM	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\ln L$	-0.098***	-0.101***	-0.096***	-0.111***	-0.030***	-0.137***	-0.069***	-0.132***	-0.138***	-0.021
	(0.0033)	(0.0082)	(0.0031)	(0.0035)	(0.0098)	(0.0090)	(0.0233)	(0.0087)	(0.0100)	(0.0273)
Trust	-0.159**	-0.169*	-0.158***	-0.104**	-0.211*	-0.511***	0.149	-0.492***	-0.347***	-0.123
	(0.0653)	(0.0942)	(0.0601)	(0.0414)	(0.1054)	(0.1058)	(0.2541)	(0.0982)	(0.0814)	(0.2507)
Trust$\times \ln L$						0.101***	-0.100	0.096***	0.070***	-0.025
						(0.0218)	(0.0686)	(0.0211)	(0.0229)	(0.0634)
Controls	X	X	X	X	X	X	X	X	X	X
No. Clusters	133	126	133	133	133	133	126	133	133	133
R^2	0.17	0.11	0.15	0.27	0.25	0.17	0.11	0.15	0.27	0.25
N	112954	61228	112954	112954	112954	112954	61228	112954	112954	112954
Specification	1	2	3	4	5	1	2	3	4	5

Notes: All specifications include controls for log firm age, regional log gdp per capita, share of population that is college educated, as well as 3 digit SIC and country fixed effects. Full sample consists of Bulgaria, Bosnia and Herzogovina, Estonia, Finland, Germany, Italy, Netherlands, Poland, Spain, Switzerland, Ukraine. In specification 1, a firm is defined as FM if one family is listed under management and that last name owns at least 20% equity held by individual shareholders. In specification 2, the FM definition is analogous to that in the main specifications, but only firms without any company listed as a shareholder are included. In specification 3, the FM definition is analogous to that in the main specifications but with a 40% equity cutoff for ownership (rather than 20%). In specification 4, FM is a continuous measure defined as the share of managers with the same last name as the largest shareholder with more than 20% equity. In specification 5, a firm is defined as FM if the largest owner with more than 20% equity has a manager with a CEO-like string in their title.

Table XI: Robustness II: Trust and Managerial Mode Choices, Heterogeneous Effects

Dependent:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
FM															
ln L	-0.104***	-0.108***	-0.102***	-0.125***	-0.043***	-0.101***	-0.108***	-0.098***	-0.121***	-0.041***	-0.095***	-0.094***	-0.093***	-0.109***	-0.032***
	(0.0040)	(0.0105)	(0.0038)	(0.0048)	(0.0092)	(0.0040)	(0.0104)	(0.0037)	(0.0043)	(0.0091)	(0.0032)	(0.0082)	(0.0030)	(0.0036)	(0.0098)
Trust	-0.200***	-0.179*	-0.193***	-0.136***	-0.294**	-0.243***	-0.228**	-0.236***	-0.168***	-0.316**	-0.297***	-0.233**	-0.293***	-0.160***	-0.548***
	(0.0690)	(0.0997)	(0.0658)	(0.0462)	(0.1146)	(0.0682)	(0.1069)	(0.0667)	(0.0461)	(0.1135)	(0.1024)	(0.1116)	(0.0914)	(0.0583)	(0.1691)
Complex	-0.017**	-0.021**	-0.017**	-0.013**	-0.009*										
	(0.0081)	(0.0089)	(0.0075)	(0.0062)	(0.0054)										
Complex×Trust						0.092**	0.118	0.092***	0.066**	0.060**					
						(0.0385)	(0.0934)	(0.0353)	(0.0307)	(0.0279)					
HighRol×Trust											0.255*	0.178	0.249**	0.086	0.704***
											(0.1292)	(0.1969)	(0.1193)	(0.0790)	(0.2002)
Controls	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
No. Clusters	133	122	133	133	133	133	122	133	133	133	133	126	133	133	133
R^2	0.17	0.11	0.15	0.28	0.23	0.18	0.12	0.16	0.30	0.23	0.16	0.10	0.14	0.25	0.25
N	41778	24682	41778	41778	41778	41778	24682	41778	41778	41778	112954	61228	112954	112954	112954
Specification	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Notes: All specifications include controls for log firm age, regional log gdp per capita and share of population that is college educated, as well as 3 digit SIC and country fixed effects. Columns (1)-(5) where the complexity dummy is not interacted do not include industry fixed effects. Columns (1)-(5) exclude industry fes. Full sample consists of Bulgaria, Bosnia and Herzogovina, Estonia, Finland, Germany, Italy, Netherlands, Poland, Spain, Switzerland, Ukraine. Complex is complexity measure defined in text. HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland. In specification 1, a firm is defined as FM if one family is listed under management and that last name owns at least 20% equity held by individual shareholders. In specification 2, the FM definition is analogous to that in the main specifications, but only firms without any company listed as a shareholder are included. In specification 3, the FM definition is analogous to that in the main specifications but with a 40% equity cutoff for ownership (rather than 20%). In specification 4, FM is a continuous measure defined as the share of managers with the same last name as the largest shareholder with more than 20% equity. In specification 5, a firm is defined as FM if the largest owner with more than 20% equity has a manager with a CEO-like string in their title.

Table XII: Robustness III: Trust and Relative Firm Size

Dependent: $\ln L$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Trust	0.203	0.398**	0.192	0.125	0.697***	0.470***	0.530***	0.452***	0.526**	0.679***	-0.048	-0.118	-0.036	0.154	0.533**
	(0.1341)	(0.1973)	(0.1312)	(0.1495)	(0.1680)	(0.1431)	(0.1931)	(0.1416)	(0.1841)	(0.1731)	(0.3296)	(0.2104)	(0.3119)	(0.4542)	(0.2680)
FM	-0.208***	0.029	-0.207***	-0.493***	0.504***	0.011	0.148	0.016	-0.262**	0.368***	-0.339***	-0.204***	-0.335***	-0.396**	0.307**
	(0.0793)	(0.0916)	(0.0778)	(0.0950)	(0.1287)	(0.0932)	(0.1026)	(0.0906)	(0.1147)	(0.1167)	(0.1180)	(0.0667)	(0.1165)	(0.1599)	(0.1144)
Trust×FM	-0.517**	-0.780**	-0.515**	-0.181	-2.035***	-1.093***	-1.127***	-1.102***	-0.867***	-1.668***	0.206	0.194	0.190	-0.215	-1.060**
	(0.2244)	(0.3395)	(0.2203)	(0.2691)	(0.4226)	(0.2783)	(0.3832)	(0.2731)	(0.3239)	(0.3814)	(0.4243)	(0.2331)	(0.4170)	(0.5823)	(0.3215)
Complex×Trust						-0.214**	-0.010	-0.216**	-0.315**	-0.179**					
						(0.0954)	(0.1267)	(0.0935)	(0.1128)	(0.0891)					
Complex×FM						-0.114**	-0.068	-0.122**	-0.201***	-0.072					
						(0.0558)	(0.0641)	(0.0555)	(0.0682)	(0.0775)					
HighRol×Trust											-0.358	-0.412	-0.341	-0.823*	-0.463
											(0.3673)	(0.3622)	(0.3507)	(0.4881)	(0.3087)
HighRol×FM											-1.546***	-1.088***	-1.515***	-1.687***	-1.172***
											(0.2415)	(0.2754)	(0.2418)	(0.2610)	(0.1741)
Trust×FM×Complex						0.214	0.207	0.244*	0.361**	0.248					
						(0.1430)	(0.1997)	(0.1466)	(0.1512)	(0.2133)					
Trust×FM×HighRol											2.197***	1.382***	2.155***	2.878***	1.518***
											(0.5531)	(0.6128)	(0.5485)	(0.6844)	(0.4866)
Controls	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
No. Clusters	133	126	133	133	133	133	122	133	133	133	133	126	133	133	133
R^2	0.32	0.24	0.32	0.34	0.30	0.38	0.32	0.38	0.40	0.36	0.33	0.25	0.33	0.34	0.31
N	112954	61228	112954	112954	112954	41778	24682	41778	41778	41778	112954	61228	112954	112954	112954
Specification	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Notes: All specifications include controls for log firm age, regional log gdp per capita and share of population that is college educated, as well as 3 digit SIC and country fixed effects. Full sample consists of Bulgaria, Bosnia and Herzogovina, Estonia, Finland, Germany, Italy, Netherlands, Poland, Spain, Switzerland, Ukraine. Complex is complexity measure defined in text. HighRol is a dummy for high rule of law countries Germany, Netherlands, Finland and Switzerland. In specification 1, a firm is defined as FM if one family is listed under management and that last name owns at least 20% equity held by individual shareholders. In specification 2, the FM definition is analogous to that in the main specifications, but only firms without any company listed as a shareholder are included. In specification 3, the FM definition is analogous to that in the main specifications but with a 40% equity cutoff for ownership (rather than 20%). In specification 4, FM is a continuous measure defined as the share of managers with the same last name as the largest shareholder with more than 20% equity. In specification 5, a firm is defined as FM if the largest owner with more than 20% equity has a manager with a CEO-like string in their title.

Table XIII: Robustness IV: Ownership and Founder Firm Results w/40% Equity Cutoff

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent:	$\ln L$	$\ln TFPQ$	$\ln TFPQ$	$\ln L$	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$	$\ln TFPQ$
FOFM	-0.552***	-0.399***	-0.222***	-0.189***	-0.135***	-0.082***				
	(0.0062)	(0.0088)	(0.0085)	(0.0097)	(0.0124)	(0.0119)				
FOPM	-0.385***	-0.297***	-0.167***	0.025**	-0.002	0.001	-0.214***	-0.071***	-0.098***	-0.066***
	(0.0069)	(0.0087)	(0.0083)	(0.0101)	(0.0126)	(0.0121)	(0.0270)	(0.0260)	(0.0313)	(0.0306)
$\ln$ Age							-0.087***	-0.117***	-0.075***	-0.120***
							(0.0062)	(0.0057)	(0.0083)	(0.0080)
FOFM$\times \ln$ Age							-0.012	-0.023**	-0.013	-0.006
							(0.0097)	(0.0093)	(0.0111)	(0.0108)
Sample	All	All	All	Ind	Ind	Ind	All	All	Ind	Ind
Firm Size Control			X			X		X		X
Country FE	X	X	X	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X	X	X	X
Country Controls	X	X	X	X	X	X	X	X	X	X
Firm Controls	X	X	X	X	X	X	X	X	X	X
R^2	0.34	0.36	0.43	0.24	0.35	0.39	0.35	0.43	0.35	0.39
N	112952	73062	73062	61227	50013	50013	73062	73062	50013	50013

Note: All specifications include 3 digit SIC and country fixed effects. Robust standard errors reported in parentheses. Country controls include regional log GDP and college share. Firm controls include log age. All sample includes all firms, Ind sample excludes firms which are (partially) owned by companies rather than individuals.

Table XIV: Robustness V: Alternate Samples

Dependent: FM	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\ln Size$	-0.160***	-0.135***	-0.158***	-0.167***	-0.127***	-0.158***	-0.576***	-0.328***	-0.349***	-0.462***	-1.102***	-0.432***
	(0.0638)	(0.0573)	(0.0653)	(0.0646)	(0.0455)	(0.0653)	(0.1032)	(0.1161)	(0.0752)	(0.1247)	(0.1780)	(0.2012)
Trust	-0.096**	-0.091**	-0.095**	-0.116**	-0.041***	-0.028**	-0.140***	-0.110***	-0.133***	-0.149***	-0.119***	-0.035**
	(0.0032)	(0.0038)	(0.0040)	(0.0050)	(0.0038)	(0.0022)	(0.0085)	(0.0090)	(0.0111)	(0.0122)	(0.0133)	(0.0061)
Trust$\times \ln Size$							0.117***	0.053**	0.097***	0.087***	0.199***	0.021
							(0.0209)	(0.0240)	(0.0250)	(0.0293)	(0.0316)	(0.0144)
Controls	X	X	X	X	X	X	X	X	X	X	X	X
Size Measure	Emp	Emp	Emp	Emp	Emp	K	Emp	Emp	Emp	Emp	Emp	K
No. Clusters	133	133	133	133	133	122	133	133	133	133	133	122
R^2	0.17	0.24	0.20	0.16	0.18	0.14	0.17	0.24	0.20	0.16	0.19	0.14
N	105120	140002	336086	99474	27522	92058	105120	140002	336086	99474	27522	92058
Specification	1	2	3	4	5	6	1	2	3	4	5	6

Notes: All specifications include controls for log firm age, regional log gdp per capita, share of population that is college educated, as well as 3 digit SIC and country fixed effects. Specification 2 additionally includes control for registration type. Full sample consists of Bulgaria, Bosnia and Herzogovina, Estonia, Finland, Germany, Italy, Netherlands, Poland, Spain, Switzerland, Ukraine. Specification 1 is the baseline specification with firms between 10 and 5000 employees registered as Private LLCs. The remaining specifications use alternate samples relative to the baseline as follows. Specification 2 includes all registration types other than "other". Specification 3 includes firms with less than 5000 employees. Specification 4 includes firms with between 10 and 250 employees. Specification 5 includes firms with between 50 and 5000 employees similar to the WMS sampling frame. Specification 6 uses capital (or assets, as defined in the Amadeus database) instead of labor to measure firm size

Table XV: Reduced Form Effects of Past Political Institutions on Family Management

Dependent: FM	(1)	(2)
$\ln L$	-0.103***	-0.100***
	(0.0044)	(0.0029)
Institutions	-0.013*	-0.036***
	(0.0069)	(0.0091)
Institutions $\times \ln L$		0.007***
		(0.0015)
Baseline Controls	X	X
Historical Controls	X	X
No. Clusters	39	39
R^2	0.14	0.14
N	86844	86844

Notes: Institutions is the Tabellini (2010) measure of political institutions between 1600 and 1850. All specifications include historical controls (urbanization rate in 1850, school enrollment in 1960) from that paper, as well as the baseline controls used in other specifications (log firm age, regional log gdp per capita, share of population that is college educated, as well as 3 digit SIC and country fixed effects). Standard errors are clustered at the regions reported in Tabellini (2010).

FIGURES

Figure I: Sorting Pattern in the Model

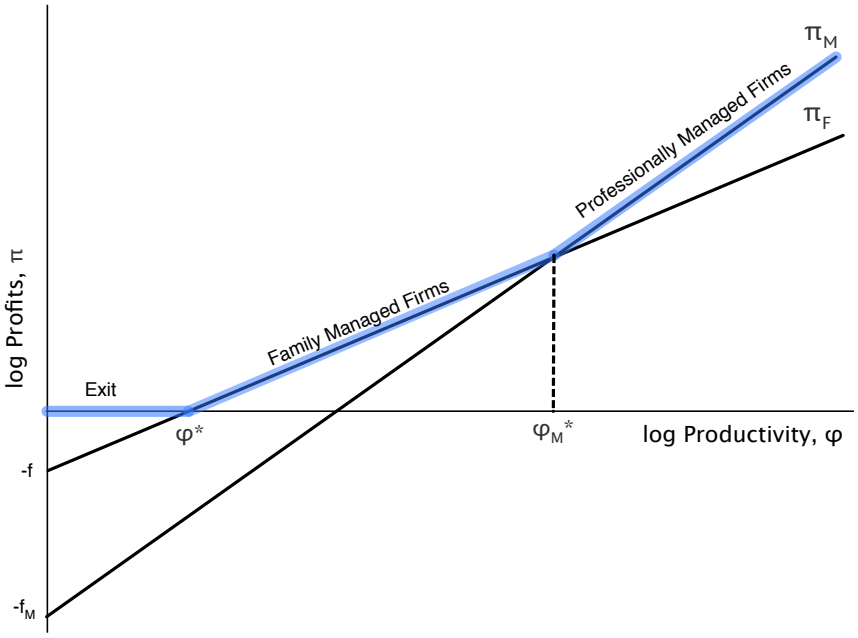
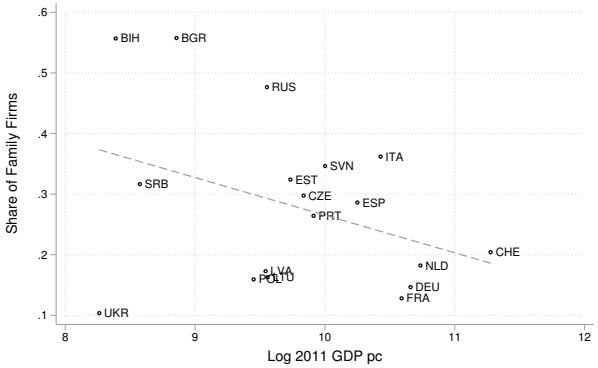


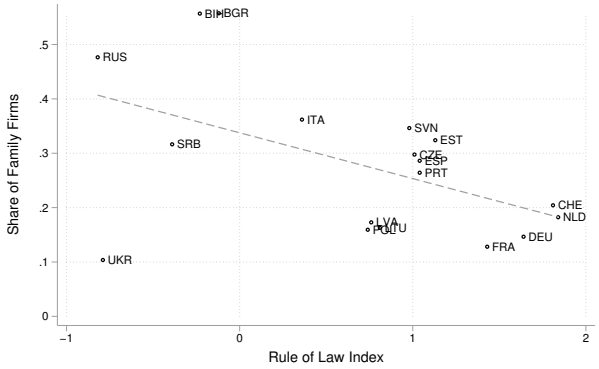
Figure II: Share of Family Firms Across Countries

(a) GDP



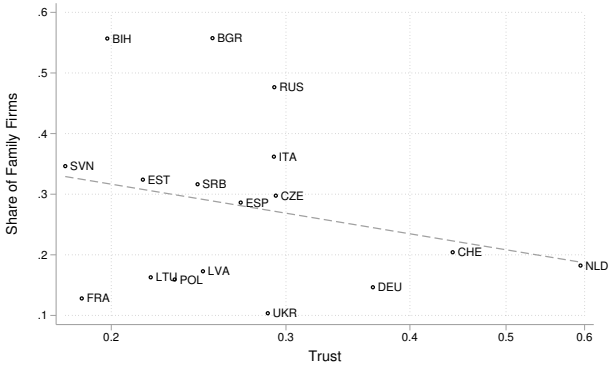
Data shows share of FOFM firms in each country against 2011 GDP.

(b) Rule of Law



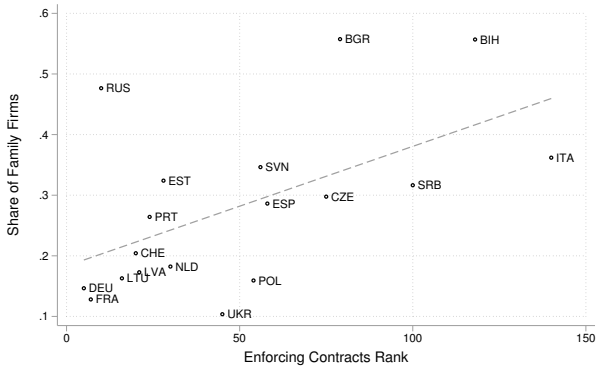
Data shows share of FOFM firms in each country against RoL index.

(c) Trust (WVS)



Data shows share of FOFM firms in each country against WVS trust score.

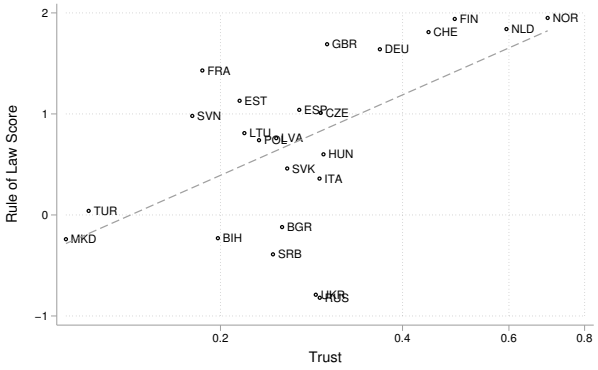
(d) Enforcing Contracts Rank (WB DBS)



Data shows share of FOFM firms in each country against enf contracts rank from WB DBS.

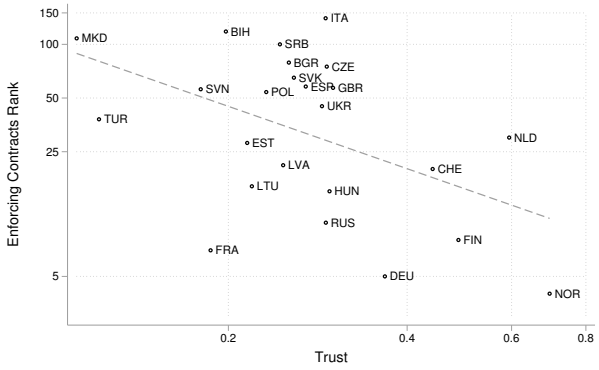
Figure III: Trust as a Proxy for Rule of Law and Enforcing Contracts

(a) Rule of Law



Plots WGI rule of law score against WVS trust country average. Correlation is 0.60.

(b) Enforcing Contracts



Plots DB Contract Enforcement Rank against WVS trust country average. Correlation is −0.41.

FAMILY FIRMS AND CONTRACTUAL INSTITUTIONS
Online Appendix

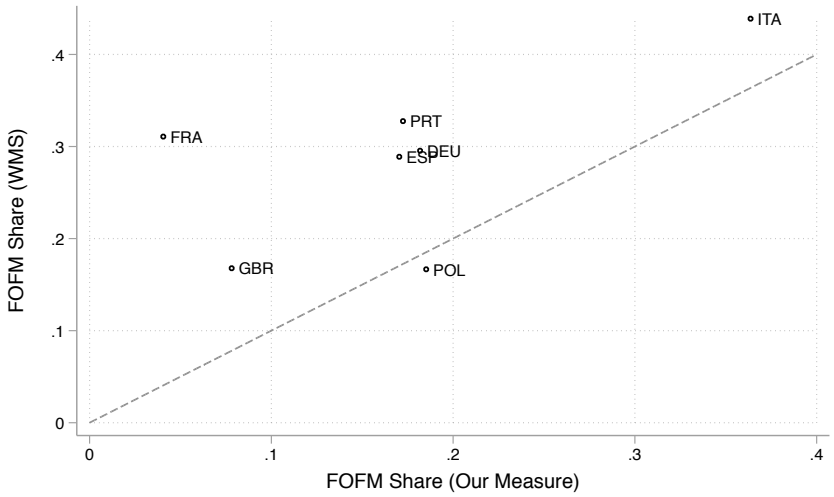
Leonardo Iacovone
William F. Maloney
Nick Tsivanidis

March, 2019

CONTENTS

A SUPPLEMENTARY FIGURES

Figure A1: Measure: Largest individual owner with 20% equity has more than 20% managers?



FOFM firms in WMS defined as those which family owned with a family CEO. FOFM according to our measure are firms for which the largest owner with more than 20% equity has more than 20% of managers with the same last name. Dashed line is 45-degree line

B SUPPLEMENTARY TABLES

Table A1: Correlation of Our Measures with WMS Measure

	(1)	(2)
Measure	Country-Level	Firm-level
All Managers same last name, own 20% equity	0.450	0.206
All Managers same last name, own 20% equity, Ind. Owners only	0.505	0.222
Any individual owner with 20% equity has manager?	0.442	0.354
Share of managers for largest owner with 20% equity	0.633	0.419
Largest owner with 20% equity has manager?	0.653	0.433

Table A2: Top and Bottom 20 Industries by Complexity Measure

	10 Least Complex		10 Most Complex	
Rank	SIC	Description	SIC	Description
1	2449	Wood Containers, Nec	3711	Motor Vehicles And Car Bodies
2	3262	Vitreous China Table And Kitchenware	3714	Motor Vehicle Parts And Accessories
3	3942	Dolls And Stuffed Toys	3081	Unsupported Plastics Film And Sheet
4	2074	Cottonseed Oil Mills	3089	Plastics Products, Nec
5	2083	Malt	3721	Aircraft
6	2999	Petroleum And Coal Products, Nec	3812	Search And Navigation Equipment
7	2298	Cordage And Twine	3731	Shipbuilding And Repairing
8	3161	Luggage	2819	Industrial Inorganic Chemicals, Nec
9	3493	Steel Springs, Except Wire	2869	Industrial Organic Chemicals, Nec
10	2021	Creamery Butter	2813	Industrial Gases
11	2823	Cellulosic Manmade Fibers	2816	Inorganic Pigments
12	2892	Explosives	2621	Paper Mills
13	3021	Rubber And Plastics Footwear	2051	Bread, Cake, And Related Products
14	2091	Canned And Cured Fish And Seafoods	3312	Blast Furnaces And Steel Mills
15	3931	Musical Instruments	3841	Surgical And Medical Instruments
16	3652	Prerecorded Records And Tapes	2834	Pharmaceutical Preparations
17	3261	Vitreous Plumbing Fixtures	2833	Medicinals And Botanicals
18	2098	Macaroni And Spaghetti	3999	Manufacturing Industries, Nec
19	3255	Clay Refractories	3949	Sporting And Athletic Goods, Nec
20	3111	Leather Tanning And Finishing	3669	Communications Equipment, Nec

Notes: Table lists top and bottom 10 industries according to the number of intermediate inputs use (from other 4-digit industries) from Levchenko (2007).

Table A3: Using Within-Region Variation for Interaction Results

	(1)	(2)	(3)	(4)
Dependent	FOFM	FOFM	$\ln L$	$\ln L$
$\ln L$	-0.133***	-0.099***		
	(0.0088)	(0.0039)		
Trust$\times \ln L$	0.089***			
	(0.0215)			
Complex$\times$Trust		0.057		-0.153
		(0.0398)		(0.0928)
FOFM			-0.242***	-0.028
			(0.0769)	(0.0905)
Trust$\times$FOFM			-0.425*	-0.972***
			(0.2175)	(0.2691)
Complex$\times$FOFM				-0.086
				(0.0553)
Trust$\times$FOFM$\times$Complex				0.164
				(0.1480)
Controls	X	X	X	X
Region FE	X	X	X	X
Clustering	Region	Region	Region	Region
No. Clusters	133	133	133	133
R^2	0.18	0.21	0.34	0.41
N	112945	41726	112943	41726

Note: All specifications include 3 digit SIC effects. Controls include log firm age, log region gdp per capita and the region's college share of residents. Complex is complexity measure defined in text. Regressions include full interactions; only coefficients with remaining within-region variation are reported.

C ADDITIONAL MODEL DETAILS

We now provide the details of the model outlined in the paper. As in much of the trade literature, we assume that G is a Pareto distribution with shape parameter θ, so that $G(\varphi) = 1 - \varphi^{-\theta}$. We assume only that $\theta > \sigma - 1$, so that the mean of this distribution is finite.

Firms. Given the Cobb-Douglas technologies available under both management modes, the cost of a unit bundle in either case is given by

$$\begin{aligned} c_F &= w \\ c_M &= \frac{1}{\lambda}\left(\frac{w}{\alpha}\right)^{\alpha}\left(\frac{w_M}{1-\alpha}\right)^{1-\alpha}. \end{aligned}$$

Recall we normalize $w = 1$. CES demand implies that firms charge a constant markup so that prices under either mode are given by

$$p_i(\varphi) = \frac{\sigma}{\sigma - 1}\frac{c_i}{\varphi}.$$

Variable profits are proportional to sales, so that total profits net of fixed costs are given by

$$\pi_F(\varphi) = \frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\frac{1}{\varphi P}\right)^{1-\sigma} Y - f \tag{C.1}$$

$$\pi_M(\varphi) = \frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\frac{c_M}{\varphi P}\right)^{1-\sigma} Y - f_M \tag{C.2}$$

In reference to the expression in the text, $A = \frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} P^{\sigma-1}Y$. Since $f_M > f$, we'll need that $c_M < c_F$ for any firms to be professionally managed in equilibrium. In other words, contractual frictions cannot completely crowd out the productivity benefit of external managers. This requires that $c_M = \frac{1}{\lambda}\left(\frac{1}{\alpha}\right)^{\alpha}\left(\frac{w_M}{1-\alpha}\right)^{1-\alpha} < 1$.

Technology Choice. Since fixed costs are higher but variable costs are lower under professional management, the equilibrium is characterized by two cutoffs φ^* and φ_M^* such that (i) firms with $\varphi \in [1, \varphi^*)$ exit, (ii) firms with $\varphi \in [\varphi^*, \varphi_M^*)$ are family-managed and (iii) firms with $\varphi \in [\varphi_M^*, \infty)$ are professionally managed.

The exit cutoff φ^* is therefore determined by $\pi_F(\varphi^*) = 0$. Solving (C.1), we find that

$$\varphi^* = \frac{\sigma}{\sigma - 1}\frac{1}{P}\left(\frac{f\sigma}{Y}\right)^{\frac{1}{\sigma-1}}. \tag{C.3}$$

Similarly, the management cutoff φ_M^* is determined by $\pi_F(\varphi_M^*) = \pi_M(\varphi_M^*)$. To simplify the algebra, we

assume that $f_M = \eta f$ where $\eta > 1$. Solving (C.1) and (C.2), we then find that

$$\varphi_M^* = \varphi^* \left(\frac{\eta - 1}{c_M^{1-\sigma} - 1} \right)^{\frac{1}{\sigma - 1}} \tag{C.4}$$

The management cutoff is therefore proportional to the exit cutoff with constant of proportionality that depends on the relative wage and productivity of managers. Note that our prior restrictions ensure $\eta > c_M^{1-\sigma}$, so that both modes are chosen in equilibrium (since $\varphi_M^* > \varphi^*$).

Entry. Free entry drives expected profits to zero. The cost of entry is f^e while the benefit is expected profits conditional on survival. Equating these expressions, this condition becomes $f^e = [1 - G(\varphi^*)]\bar{\pi}$, where $\bar{\pi} = E\left[\pi(\varphi) | \varphi > \varphi^*\right]$. This can be shown to reduce to

$$\bar{\pi} = \frac{\sigma - 1}{\theta - \sigma + 1} f \kappa,$$

where $\kappa = 1 + (\eta - 1)^{1 - \frac{\theta}{\sigma - 1}} \left(c_M^{1-\sigma} - 1 \right)^{\frac{\theta}{\sigma - 1}} > 1$. Note that κ is a model parameter increasing in λ and p. The free entry condition then becomes

$$\frac{\sigma - 1}{\theta - \sigma + 1} f \kappa \varphi^{-*\theta} = f^e. \tag{C.5}$$

We can also compute a simple expression for aggregate productivity in the economy, which similar to the Melitz (2003) model is given by

$$\tilde{\varphi} = \left[\frac{1}{1 - F(\varphi^*)} \int_{\varphi^*}^{\infty} \left(\frac{\varphi}{c(\varphi)} \right)^{\sigma - 1} dG(\varphi) \right]^{\frac{1}{\sigma - 1}} = \varphi^* \left(\frac{\theta \kappa}{\theta - \sigma + 1} \right)^{\frac{1}{\sigma - 1}}. \tag{C.6}$$

Aggregate productivity is increasing in the productivity cutoff φ^*. It can be shown that the price index can be written in terms of this average productivity, and is given by $P = M^{\frac{1}{1-\sigma}} \frac{\sigma}{\sigma - 1} \frac{1}{\tilde{\varphi}}$. That is, the economy behaves as if there is a representative firm with productivity $M^{\frac{1}{\sigma - 1}} \tilde{\varphi}$.

Firms die at constant rate δ, so in steady state the mass of exitors must equal the mass of entrants. Since $1 - G(\varphi^*) = \varphi^{*-\theta}$ under the Pareto distribution, this reduces to

$$\delta M = \varphi^{*-\theta} M^E \tag{C.7}$$

Closing the Model. We close the model by clearing both types of labor market. Labor market clearing requires that

$$L = M^e \left(f^e + E\left[\ell^v\right] \right) + M f \kappa, \tag{C.8}$$

where aggregate fixed costs are adjusted by κ to reflect the differing costs paid by family- and professionally-

managed firms. Factor demands are given by

$$\ell_F(\varphi) = \frac{y(\varphi)}{\varphi}$$
$$\ell_M(\varphi) = \frac{y(\varphi)}{\varphi} c_M \left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha}$$

With some algebra, it can be shown that[1]

$$E\left[\ell^v\right] = \varphi^{-*\theta} \frac{\theta\kappa(\sigma-1)}{\theta-\sigma+1} f \tag{C.9}$$

Combining (C.5), (C.7),(C.8) and (C.9) we arrive at

$$L = M^e f^e \frac{\theta(1+\delta)}{\sigma-1}. \tag{C.10}$$

The mass of entrants is pinned down uniquely by the size of the labor force.

Manager market clearing requires unemployment to sustain efficiency wages in equilibrium. We are agnostic on the matching process in the market for managers, and instead let the unemployment rate $u \in [0,1]$ adjust until the demand for managers is equated with supply in steady state. This requires that $(1-u)L^S = M^e E\left[m(\varphi)\right]$, which in terms of the results above implies

$$(1-u)L^S = M^e c_M^{1-\sigma} \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{\frac{\sigma-2\theta-1}{\sigma-1}} \frac{\delta f^e}{\kappa} \tag{C.11}$$

Competitive Equilibrium. An equilibrium is then a tuple $\{\varphi^*, M^E, u\}$ that satisfies

$$\begin{aligned} f^e =& \frac{\sigma-1}{\theta-\sigma+1} f\kappa\varphi^{-*\theta} \\ L =& M^e f^e \frac{\theta(1+\delta)}{\sigma-1} \\ (1-u)L^S =& M^e c_M^{1-\sigma} \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{\frac{\sigma-2\theta-1}{\sigma-1}} \frac{\delta f^e}{\kappa} \end{aligned}$$

Note that given $\{\varphi^*, M^E, u\}$ we can use previously defined relations to pin down the remaining endogenous variables $\{Y, \varphi^*_M, M\}$.

[1]This clean aggregation occurs only when $\alpha = 1/2$. If not, we introduce a second constant κ_2 (equal to κ iff $\alpha = 1/2$). The results are the same, but the algebra is less simple.

D PROOFS

Proof of Prediction 1. Recall that $\kappa = 1 + (\eta - 1)^{1-\frac{\theta}{\sigma-1}} \left(c_M^{1-\sigma} - 1\right)^{\frac{\theta}{\sigma-1}}$. An increase in p reduces c_M and increases κ. In response, we see that φ^* must rise to equate free entry in (C.5). Average productivity $\tilde{\varphi}$ rises and P falls. There are two effects on φ_M^*: a first order effect that causes it to fall since the marginal cost of professional management has fallen, and a second order effect causing it to rise as wages rise in equilibrium (through the increase in φ^*). Rewriting the (C.4) using (C.5) we have

$$\varphi_M^* = \left(\frac{\delta f^e(\theta - \sigma + 1)}{(\sigma - 1) f \kappa}\right)^{-\frac{1}{\theta}} \left(\frac{\eta - 1}{c_M^{1-\sigma} - 1}\right)^{\frac{1}{\sigma-1}} \propto \kappa^{1/\theta} (c_M^{1-\sigma} - 1)^{-\frac{1}{\sigma-1}}.$$

Differentiating wrt c_M we get

$$\frac{d\varphi_M^*}{dc_M} \propto \frac{1}{\theta} \kappa^{\frac{1}{\theta}-1} (c_M^{1-\sigma} - 1)^{-\frac{1}{\sigma-1}} \frac{d\kappa}{dc_M} + \kappa^{\frac{1}{\theta}} (c_M^{1-\sigma} - 1)^{-\frac{1}{\sigma-1}-1} c_M^{-\sigma}$$

Using the definition of κ we have

$$\frac{d\kappa}{dc_M} = -\theta \left(\frac{\eta - 1}{c_M^{1-\sigma} - 1}\right)^{1-\frac{\theta}{\sigma-1}} c_M^{-\sigma} < 0.$$

This shows the two counteracting forces on φ_M^* - the second (positive) term is the first order effect pushing up the cutoff, the first (negative) term is the second order effect pushing it down through decreased competition.

Continuing, we arrive at

$$\frac{d\varphi_M^*}{dc_M} \propto \kappa^{\frac{1}{\theta}-1} (c_M^{1-\sigma} - 1)^{-\frac{\sigma}{\sigma-1}} c_M^{-\sigma} > 0$$

so that the first order effect dominates. Since $\frac{d\varphi_M^*}{dp} = \frac{\partial \varphi_M^*}{\partial c_M} \frac{dc_M}{dp}$ and $\frac{dc_M}{dp} = -\frac{1}{\lambda} \left(\frac{1-\alpha}{\alpha}\right)^{\alpha} e^{1-\alpha} p^{\alpha-2} < 0$, this delivers $\frac{d\varphi_M^*}{dp} < 0$ as required. ■

Proof of Prediction 3. **(i) Family Firm Size.** First, let's consider family firms. Average (variable) employment by family firms is given by $E\left[\ell^v | \varphi^* < \varphi < \varphi_M^*\right]$. We have that

$$\begin{aligned}
E\left[\ell_F^v | \varphi^* < \varphi < \varphi_M^*\right] &= \int_{\varphi^*}^{\varphi_M^*} \frac{y(\varphi)}{\varphi} \frac{dG(\varphi)}{G(\varphi_M^*) - G(\varphi^*)} \\
&= \frac{\varphi^{*\theta}}{\kappa_2} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} Y P^{\sigma-1} \int_{\varphi^*}^{\varphi_M^*} \varphi^{\sigma-1} dG(\varphi) \\
&= \frac{\varphi^{*\theta}}{\kappa_2} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} \frac{\theta Y P^{\sigma-1}}{\theta - \sigma + 1} \left(\varphi^{*\sigma-\theta-1} - \varphi_M^{*\sigma-\theta-1}\right) \\
&= \frac{\varphi^{*\theta}}{\kappa_2} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} \frac{\theta Y P^{\sigma-1}}{\theta - \sigma + 1} \varphi^{*\sigma-\theta-1} \kappa_3
\end{aligned}$$

$$= \varphi^{*\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma}\frac{\theta Y P^{\sigma-1}}{\theta-\sigma+1}\frac{\kappa_3}{\kappa_2}$$

where $\kappa_2 = 1 - \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{-\frac{\theta}{\sigma-1}}$ and $\kappa_3 = 1 - \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{1-\frac{\theta}{\sigma-1}}$. Note that $\eta > c_M^{1-\sigma}$ ensures κ_2 and κ_3 are positive since $\theta > \sigma - 1$. Moreover, both are increasing in c_M. Using the definition of φ^* from (C.3), this becomes

$$E\left[\ell_F^v | \varphi^* < \varphi < \varphi_M^*\right] = \frac{\theta(\sigma-1)f}{\theta-\sigma+1}\frac{\kappa_3}{\kappa_2}.$$

We want to sign $d(\kappa_3/\kappa_2)/dc_M$. We require $\frac{d\kappa_3}{dc_M} > \frac{d\kappa_2}{dc_M}$. This occurs when

$$\begin{aligned}
\frac{d\kappa_3}{dc_M} &> \frac{d\kappa_2}{dc_M} \\
(\theta-\sigma+1)\left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{1-\frac{\theta}{\sigma-1}}(c_M^{1-\sigma}-1)^{-1} &> \theta\left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{-\frac{\theta}{\sigma-1}}(c_M^{1-\sigma}-1)^{-1} \\
\frac{\eta-1}{c_M^{1-\sigma}-1} &> \frac{\theta}{\theta-\sigma+1}.
\end{aligned}$$

Since both are only restricted to be greater than one, the result is ambiguous.

(ii) Professionally Managed Firm Size. Now consider professionally managed firms. Total (variable) employment is $L_M^v(\varphi) = \ell_M^v(\varphi)^\alpha m(\varphi)^{1-\alpha}$. Substituting in expressions from the text, this delivers

$$L_M^v(\varphi) = \frac{y(\varphi)}{\varphi}\frac{1}{\lambda\alpha^\alpha(1-\alpha)^{1-\alpha}} = \left(\frac{\sigma}{\sigma-1}c_M\right)^{-\sigma}\frac{\varphi^{\sigma-1}\lambda^{\sigma-1}P^{\sigma-1}Y}{\alpha^\alpha(1-\alpha)^{1-\alpha}}.$$

Therefore average firm size is given by $E\left[L_M^v(\varphi)|\varphi > \varphi_M^*\right] = \frac{1}{1-F(\varphi_M^*)}\int_{\varphi_M^*}^\infty L_M^v(\varphi)dG(\varphi)$. It is instructive to first examine the different effects of an improvement $dp > 0$ using Liebniz' rule[2]

$$\frac{dE\left[L_M^v\right]}{dp} = \underbrace{\frac{d\varphi_M^*}{dp}\left[\left(\frac{d}{d\varphi_M^*}\frac{1}{1-G(\varphi_M^*)}\right)\int_{\varphi_M^*}^\infty L_M^v(\varphi)dG(\varphi) - \frac{1}{1-G(\varphi_M^*)}L_M^v(\varphi_M^*)\right]}_{\text{Extensive Margin}}$$
$$+ \underbrace{\frac{1}{1-G(\varphi_M^*)}\int_{\varphi_M^*}^\infty \frac{dL_M^v}{dp}(\varphi)dG(\varphi)}_{\text{Intensive Margin}}$$

Along the extensive margin, average employment is pushed down as the support of productivity decreases with the fall in the cutoff (the first term) but is pushed up as total employment rises (the second term). Although the net effect depends on parameters, for most values it is negative. Along the intensive margin the effect on average firm size is unambiguously positive since $\frac{dL_M}{dp}(\varphi) > 0$. To look at the total effect, we

[2]This same decomposition is discussed, but not formally illustrated, in the example of family firms above.

can compute the integration and substitutions to find

$$E\left[L_M^v(\varphi)|\varphi > \varphi_M^*\right] = \left(\frac{\sigma}{\sigma-1}c_M\right)^{-\sigma} \frac{P^{\sigma-1}Y}{\lambda\alpha(1-\alpha)^{1-\alpha}} \frac{\theta}{\theta-\sigma+1}\varphi_M^{*\sigma-1}$$
$$= \frac{(\sigma-1)f}{\lambda\alpha^{\alpha}(1-\alpha)^{1-\alpha}} \frac{\theta}{\theta-\sigma+1} \frac{1}{c_M - c_M^{\sigma}}.$$

The first line makes the trade off clear: an improvement $dp > 0$ increases average firm size along the intensive margin by reducing c_M, but reduces along the extensive margin (by reducing φ_M^* as previously shown). Differentiating the last term with respect to c_M yields that

$$\frac{dE\left[L_M^v(\varphi)|\varphi > \varphi_M^*\right]}{dc_M} < 0 \Leftrightarrow c_M < \sigma^{\frac{1}{1-\sigma}}$$

Since $\sigma^{\frac{1}{1-\sigma}} < 1 \; \forall \sigma > 1$ and we have only impose $c_M < 1$, the restriction again depends on parameter values.

(iii) Average Firm Size. By similar reasoning, the effect on average firm size is unambiguously positive. We have that

$$\begin{aligned}
E\left[\ell^v|\varphi^* < \varphi\right] &= \int_{\varphi^*}^{\infty} \frac{y(\varphi)}{\varphi} \frac{dG(\varphi)}{1-G(\varphi^*)} \\
&= \varphi^{*\theta}\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} YP^{\sigma-1}\left[\int_{\varphi^*}^{\varphi_M^*} \varphi^{\sigma-1}dG(\varphi) + c_M^{1-\sigma}\int_{\varphi_M^*}^{\infty}\varphi^{\sigma-1}dG(\varphi)\right] \\
&= \varphi^{*\theta}\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} YP^{\sigma-1}\frac{\tilde{\varphi}^{\sigma-1}}{\varphi^{*\theta}} \\
&= \varphi^{*\sigma-1}\left(\frac{\theta\kappa}{\theta-\sigma+1}\right)\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} YP^{\sigma-1} \\
&= \frac{(\sigma-1)\theta\kappa f}{\theta-\sigma+1}
\end{aligned}$$

which is increasing in κ, itself increasing in p. ■

Proof of Prediction 4. This immediately follows equation (C.6) and our previous results, since both φ^* and κ rise in response to an increase in p. The decomposition into the two channels discussed in the text follows from the Liebniz rule. ■

Proof of Prediction 5. To see that high-λ industries have lower professional management cutoffs, use that from above we have $\varphi_M^* = \kappa^{1/\theta}(c_M^{1-\sigma}-1)^{-\frac{1}{\sigma-1}}$. Then the same algebra as in the proof of prediction 1 yields

$$\frac{d\varphi_M^*}{d\lambda} \propto \kappa^{\frac{1}{\theta}-1}(c_M^{1-\sigma}-1)^{-\frac{1}{\sigma-1}-1}c_M^{-\sigma}\frac{dc_M}{d\lambda} < 0$$

since $\frac{dc_M}{d\lambda} < 0$.

Next we evaluate the differential effect of $dp > 0$ on the selection cutoff φ_M^*. Since $\frac{d\varphi_M^*}{dp} = \frac{\partial \varphi_M^*}{\partial c_M}\frac{\partial c}{\partial p}$, we compute the cross-derivative wrt λ as follows

$$\frac{d^2\varphi_M^*}{dpd\lambda} = \underbrace{\frac{\partial^2 \varphi_M^*}{\partial c_M^2}}_{?}\underbrace{\frac{\partial c_M}{\partial \lambda}}_{<0}\underbrace{\frac{\partial c_M}{\partial p}}_{<0} + \underbrace{\frac{\partial \varphi_M^*}{\partial c_M}}_{>0}\underbrace{\frac{\partial^2 c_M}{\partial p \partial \lambda}}_{>0}$$

where the signs of the derivatives of c_M can be easily verified using the definitions above. It remains to compute $\frac{\partial^2 \varphi_M^*}{\partial c_M^2}$. Using the expression for $\frac{d\varphi_M^*}{dc_M}$ derived above, tedious algebra shows that

$$\frac{\partial^2 \varphi_M^*}{\partial c_M^2} \propto \kappa^{\frac{1}{\theta}-1}(c_M^{1-\sigma}-1)^{-\frac{\sigma}{\sigma-1}} c_M^{-2\sigma}\left[\frac{(\theta-1)(\kappa-1)}{\kappa} + \frac{\sigma}{c_M^{1-\sigma}(c_M^{1-\sigma}-1)}\right] > 0$$

which completes the proof that the response of the selection cutoff is attenuated in high-λ industries. ■

Proof of Proposition 1. Combining (C.5) and (C.6) from above, we get that

$$TFP = \left(\frac{\delta f^e(\theta-\sigma+1)}{(\sigma-1)f\kappa}\right)^{-\frac{1}{\theta}}\left(\frac{\theta\kappa}{\theta-\sigma+1}\right)^{\frac{1}{\sigma-1}} \propto \kappa^{\nu} \tag{D.12}$$

where $\nu \equiv \frac{\theta+\sigma-1}{\theta(\sigma-1)}$ and all parameters other than κ are assumed to be unchanged by contractual institutions. Next, notice that $\kappa = 1 + \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{-\frac{\theta}{\sigma-1}}(\eta-1)$ depends on both the fixed and marginal costs of professional management. Intuitively this should be revealed by the share of professionally managed firms in the economy. Computing the expression for this share, we find that

$$\lambda_P = \frac{1-F(\varphi_M^*)}{1-F(\varphi^*)} = \left(\frac{\eta-1}{c_M^{1-\sigma}-1}\right)^{-\frac{\theta}{\sigma-1}}. \tag{D.13}$$

This shows that changes in λ_P only identify the net effect of both the fixed and marginal costs of professional management. We therefore continue to assume that contractual institutions only affect the marginal cost of professional management (so that η is constant across equilibria), and make the additional convenient normalization $\eta - 1 = 1$. In this case, we find that $\kappa = 1 + \left(c_M^{1-\sigma}-1\right)^{\frac{\theta}{\sigma-1}}$. We therefore have that

$$\begin{aligned} \kappa &= 1 + \lambda_P \\ \Leftrightarrow \widehat{TFP} &= \widehat{1+\lambda_P}^{\nu} \end{aligned}$$

as required. ■

E ALTERNATIVE MODELS

EA. Endogenous Monitoring

The model is the same as before, but we now allow for endogenous monitoring. Firms can affect the probability of detecting shirking by external managers by monitoring at rate $\mu \in [0,1]$. The probability of detection is then $p(\mu) = \omega\mu^{\eta}$ (ω summarizes aggregate technology) but this comes at a cost $c(\mu) = \kappa\mu^{\beta}$. We assume timing is such that firms monitoring choice is made before production. Then total profits for a given μ under professional management are

$$\pi_M(\varphi, m) = \frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\frac{1}{\varphi P}\frac{c_M}{\mu^{\eta}}\right)^{1-\sigma} Y - \kappa\mu^{\beta} - f$$

where $c_M = \frac{1}{\lambda}\left(\frac{1}{\alpha}\right)^{\alpha}\left(\frac{e}{(1-\alpha)\omega}\right)^{1-\alpha}$ is the "undistorted" marginal cost under professional management if monitoring by firms is complete. This shows clearly how lower levels of monitoring act as an output tax on firms, and any size-dependent monitoring choices will act as size-dependent distortions on firms.

At an interior, firms optimal monitoring choices imply that

$$\mu(\varphi) = \left[\frac{\eta Y}{\beta\kappa}\left(\frac{\sigma-1}{\sigma}\right)^{\sigma}\left(\frac{\varphi P}{c_M}\right)^{\sigma-1}\right]^{\frac{1}{\delta}}$$

where we assume $\delta = \beta - \eta(\sigma-1) > 0$, i.e. that costs are sufficiently convex relative to benefits, so that monitoring is increasing in (i) productivity, (ii) the relative benefits of managers λ or the average quality of institutions ω (which lower c_M), and decreasing in average cost κ. By solving for $m(\bar{\varphi}) = 1$, we can show there is a cutoff at which monitoring is complete and there is no distortion (amongst firms using professional managers):

$$\bar{\varphi} = \left(\frac{\beta\kappa}{\eta Y}\right)^{\frac{1}{\sigma-1}}\left(\frac{\sigma-1}{\sigma}\right)^{\frac{\sigma}{1-\sigma}}\frac{c_M}{P}$$

Firms with $\varphi > \bar{\varphi}$ are undistorted, and thus poor contractual institutions are shown to be a size-dependent policy that constrains medium-sized firms through the lens of the model. Lengthy algebra shows that the same predictions derive from this model: a cutoff above which all firms hire professional managers, and the comparative statics go in the same qualitative direction.

EB. Lucas (1978) Extension

The qualitative results derived in the paper are isomorphic to those derived from an extension of the Lucas (1978) model, which supports firm heterogeneity through decreasing returns on the supply side rather than through love-of-variety through the demand side. We illustrate here the equivalence between the two models.

Firm technology is given by

$$Y(\varphi) = \varphi^{1-\eta}\left(L^{\gamma}M^{1-\gamma}\right)^{\eta}.$$

Each entrepreneur is endowed with $M = 1$, which she uses under family management. As in the model, the entrepreneur can increase managerial inputs by hiring a professional manager. There is decreasing returns in both cases, but the degree is steeper when no managers are used since $\gamma, \eta \in (0, 1)$.

Under family management, entrepreneurs take the price of labor w as given and solve

$$\max_{L} \varphi^{1-\eta} L^{\gamma\eta} - wL.$$

They face a fixed cost $f > 0$ to produce, which generates a profit function given by

$$\pi_F(\varphi) = (1 - \gamma\eta) \left[\varphi^{1-\eta} \left(\frac{\gamma\eta}{w} \right)^{\gamma\eta} \right]^{\frac{1}{1-\gamma\eta}} - f.$$

This is concave in productivity since $\gamma < 1$.

Under professional management, entrepreneurs face the same principal-agent problem as before and again pay an incentive compatible wage $w_M = e/p$ to managers. With a higher fixed cost $\tilde{f} > f$ to produce, the profit function becomes

$$\pi_M(\varphi) = \frac{\varphi}{\eta} \left[\left(\frac{\gamma\eta}{w} \right)^{\gamma\eta} \left(\frac{(1-\gamma)\eta}{w_M} \right)^{(1-\gamma)\eta} \right]^{\frac{1}{1-\eta}} - \tilde{f}.$$

This is linear in productivity.

The sorting of firms between management modes will be identical to that in the paper: more productive firms are willing to trade off the higher fixed costs of professional management in return for the reduction in marginal cost which comes from being able to avoid the decreasing returns to scale arising from the entrepreneurs fixed stock of managerial input.