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University of Naples Federico II

University of Salerno

Bocconi University, Milan

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES
80126 NAPLES - ITALY
Tel. and fax +39 081 675372 – e-mail: csef@unina.it
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The Rise and Fall of Family Firms in the Process of Development

Maria Rosaria Carillo[*], Vincenzo Lombardo[**] and Alberto Zazzaro[***]

Abstract
This paper explores the causes and the consequences of the evolution of family firms in the growth process. The theory suggests that in early stages of development, valuable family specific human capital stimulated the productivity of family firms and the development process. However, in light of the rise in the importance of managerial talents for firms' productivity in later stages, family firms generated a misallocation of managerial talents, curbing productivity and economic growth. Evidence supports the dual impact of family firms in the development process and the role of socio-cultural characteristics in observed variations in the productivity of family firms.

JEL Classification: D2, J62, L26, O14, O33, O4, Z1.

Keywords: Family firms, economic development and growth, culture and social structure, allocation of talents, industrialization

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[*] Università di Napoli Parthenope, carillo@uniparthenope.it.

[**] Corresponding author, Università di Napoli Parthenope, vincenzo.lombardo@uniparthenope.it

[***] Università di Napoli Federico II, CSEF and MoFiR, alberto.zazzaro@unina.it.

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1 Introduction

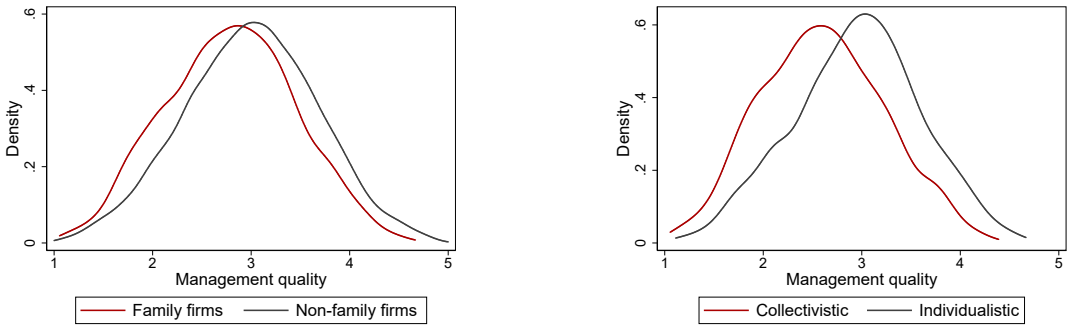
Conventional wisdom suggests that family firms emerged in the early stages of industrialization due to their importance in mitigating information and incentive constraints for business ventures (Pollak, 1980; Burkart et al., 2003). Nevertheless, the rising importance of managerial talents in the process of development has gradually diminished the pivotal role of kinship in business organization, as desirable managerial skills have often been absent in the pool of talents within the family (Chandler, 1990; Bertrand and Schoar, 2006). Countries where institutional and economic barriers to entry have permitted family firms to preserve their predominant role, degenerate into cronyism, producing a misallocation of talents, and hindering social mobility, innovation and growth(Morck and Yeung, 2003; Alesina and Giuliano, 2015).

Despite the existing narrative about the rise and the fall in the importance of family firms, a theory that captures the underlying forces in the changing role of family firms in the process of development has been absent. This paper advances a unified theory of the rise and fall of family firms. The theory highlights the beneficial effects of family firms in early stage stages of development and the endogenous decline in their productivity in later stages of development. Moreover, the research generates novel testable predictions, about the roots of the variation in the prevalence of family firms across societies, establishing the role of socio-cultural characteristics in observed variations in the productivity of family firms.

The family firm is a common form of business organization regardless of the stage of development of the economy, even among large publicly listed companies in modern high-income countries (La Porta et al., 1999). While the predominance of family firms can be hardly viewed as a proximate determinant of economic development, it is the capacity to invest in the entrepreneurial capital of family members involved in the family business, and to adopt good management practices conducive to technological innovations that explains their positive or negative role in the process of development. In many cases, family firms have proven to be capable of keeping up with organizational and technological changes across generations, conditioning the continuation of the company within the family to rigorous processes of formal training and practical experience for descendants (Bennedsen and Foss, 2015).

By the same token, the econometric evidence does not unambiguously support the hypothesis of family firms' underperformance (Anderson and Reeb, 2003; Villalonga and Amit, 2006; Sraer and Thesmar, 2007). Most importantly, the evidence suggests that the negative impact of the family's involvement in the company's management tends to disappear if the family CEO has accumulated enough human capital (Pérez-González, 2006), and that the socio-cultural environment in which family firms are embedded is a key factor to understand differences in the management quality of family firms (Bloom and Van Reenen, 2007).

Figure 1: Management quality across firms's type and cultural attributes



(a) Family vs non-family firms

(b) Collectivistic vs individualistic societies

Note. Individualistic (collectivistic) are countries in which the degree of individualism (Hofstede et al., 2010) is greater (lower) than the median (plot (b)).

Figure 1 illustrates the heterogeneity of family firms quality and its link with the socio-cultural environment. Plot (a) shows that not only family firms have a lower average management quality than non-family ones, but also that the distribution of management quality across family firms is more spread out and has a fatter left tail of badly managed firms than that of non-family firms. Focusing on the quality of family firms across societies, plot (b) suggests that on average, family firms are managed worse in societies sharing collectivistic values than in individualistic societies; in particular, in the former the tail of badly managed firms is much fatter.[1]

Our model accounts for the variety of family firms in terms of quality of management practices and their diverse impact on economic development. Therefore, the model generates an endogenous evolution of the economy consistent with studies documenting that the process of industrial development is associated with an initial large number of small-sized family firms, and a selection process for which badly managed family firms are replaced by well-managed and innovative family and non-family firms (Chandler, 1977; Atack, 1986; Gollin, 2008).

We analyze the succession in family firms and the choice of management technology in a Lucas (1978) economy with overlapping generations.[2] Managerial capital is fed by two sources: the entrepreneurial human capital of the firm leader and the family specific human capital. Entrepreneurial human capital can be acquired by any individual through education, and its productivity is influenced by personal innate ability. By contrast, family specific human capital can be exploited only by entrepreneurs' descendants and its productivity is less responsive to the individual innate ability of the latter,

[1] Moreover, the quality of management practices used by family firms is positively correlated with the level of income per capita, even after accounting for the (statistically insignificant) share of family firms in the economy.

[2] For a related view of management as an endogenous technology choice, see Bloom et al. (2016).

while it is sensitive to the centrality that society attributes to family legacy and interpersonal contacts in business life. In this context, two polarized groups of family firms emerge. One group is conducted by highly talented descendants, who adopt good management practices based on entrepreneurial human capital. Another is formed by family firms whose control is left to the least talented heirs who manage the company by exploiting the name, reputation and business contacts of their family, reaping a profit higher than the wage with which their low talent would be remunerate in the labor market. In addition, only the most talented workers' descendants found new enterprises since they cannot rely on the name and web of contacts of their family. As a result, with low-ability heirs continuing the family business, family firms are, on average, outperformed by their non-family counterparts. However, there is no difference in the quality of management and financial performance between family and non-family firms operated by highly educated entrepreneurs.

Provided that entrepreneurial human capital in the economy influences the pace of technological progress (Galor and Moav, 2000; Acemoglu et al., 2006; Doepke and Zilibotti, 2014), the output growth rate is negatively affected by the managerial value of family specific human capital. The initial stages of development are characterized by a large number of small family firms managed by exploiting family specific human capital in a slow-growing economy. As development proceeds, some family firms are replaced by new, more efficient entrants which adopt good management practices, while some of the surviving family firms intensify the use of entrepreneurial human capital. These changes promote economic growth, reducing the centrality of family specific human capital in business life and raising the value of entrepreneurial human capital. Still, the dual role of family specific human capital at the firm and aggregate level generates a "reversal of fortune" among countries in the long run. The family specific human capital supports the productivity of family firms and income per capita in the short run, but it becomes detrimental in the long run, generating a misallocation of talents and restraining the adoption of modern management practices conducive to technology growth. As a result, societies that are relatively rich in the early phase of industrialization thanks to the high productivity of firms using family specific human capital, become relatively poor in the long run.[3]

We document a number of robust correlations consistent with the major empirical implications of our theory. The negative gap in the quality of management practices between family and non-family firms is particularly marked in countries with strong collectivistic values where the importance of the family name, reputation and relationships in the local culture is high, while it tends to disappear in individualistic societies. This management quality gap is ascribable to the group of family firms which keep the management leadership within the family, relying on family specific human

[3] A similar result is obtained in a different theoretical setting by Hémous and Olsen (2017), who consider the role of relational contracts and the negative (positive) effects that tight business relationships have on broad (specific) innovations.

capital. With regard to the distribution of management quality across family firms, the share of badly (well) managed family firms is higher (lower) in societies which assign high value to family specific human capital, especially in less dynamic and innovative industrial sectors. Furthermore, the variability in the quality of management practices adopted by family firms decreases with the value of family specific human capital. Finally, countries with collectivistic-oriented values industrialize later and in late-industrialized countries the quality of family firms' management is lower than in countries with mature industrialization. However, as our theory predicts, in the early stage of development, collectivistic values support the management quality of family firms, while they do not have significant effects on the distribution of management quality across family firms.

Our paper is primarily related to three strands of literature. First, we link to the literature on the macroeconomic consequences of talent allocation and accumulation of entrepreneurial human capital, being closest in particular to Iyigun and Owen (1999), Hassler and Mora (2000) and Caselli and Gennaioli (2013). Unlike these papers, we stress the family firms' privileged access to specific managerial assets embodied in the family's name, reputation and contacts, which induces entrepreneurs to hand down the company within the family even to the least talented heirs. In this context, we study how business succession, talent allocation and quality of management practices evolve during the development process and influence the long-run growth rate.

Second, our paper links to the literature on family and social ties, firm performance and economic development (Alesina and Giuliano, 2014, 2015). Close to the spirit of our paper, Amore (2016) documents that in Italian regions characterized by weak social capital, dynastic management is pervasive, while van Hoorn (2014) shows that the quality of management practices improves in individualistic societies. At a macro level, Fogli and Veldkamp (2018) and Gorodnichenko and Roland (2017) find that the degree of individualism in society is positively associated with the rate of technology diffusion and economic growth. Buggle (2017) shows that societies using collaborative forms of irrigation agriculture in pre-industrial era favored the emergence of collectivistic values, experienced a reversal of technological advantages after 1500, and have a lower level of innovativeness in present times. We shed new light on this culture-development nexus, finding that the management quality gap between family and non-family firms is narrower and industrialization is facilitated in societies where individualistic values prevail.

Finally, we contribute to the literature on family firms (Bhattacharya and Ravikumar, 2001; Burkart et al., 2003). These studies analyze the prevalence of family firms as a result of entry barriers linked to financial market imperfections, agency problems and amenity potential, which make the succession within the family an (inefficiently) high profitable alternative option to selling the firm or hiring external managers. In such a context, the cutoff level of heirs' entrepreneurial talent above which it is opti-

mal to keep the control of the firm within the family is inefficiently low, and only very untalented heirs remain excluded from the firm's management. In this paper, we highlight a new source of competitive advantage of family control which is related to the possibility of using family specific human capital and rent-seeking management practices as an income insurance device for entrepreneurs' descendants. The managerial advantage of family firms increases the benefits of transmitting the company within the family to untalented heirs and, unlike barrier-to-entry advantages, it is consistent with the coexistence of a large tail of poorly managed family firms and a cluster of well managed family-owned enterprises (Bloom and Van Reenen, 2007, 2010).

The rest of the paper is organized as follows. In Section 2 we develop the basic theory of family firms in the process of development. In Section 3 we extend the analysis to include market for firms, managers and capital. Section 4 presents empirical results. All the proofs, data details and additional material are reported in the Appendices in the Supplementary Material.

2 The model

Consider an overlapping generations economy in which economic activity extends over infinite discrete time. In each period t, a generation is born, populated by a continuum of individuals of measure one. Individuals differ in the innate ability a_t^i, which is uniformly distributed over the unit interval, $a \sim U[0,1]$.

Each individual has a single parent and a single child such that the population is constant across households and over time.[4] Individuals live for two periods and in each period of their life they are endowed with one unit of time. In the first period (childhood), they spend the unit of time acquiring either the managerial capital required to run a firm or general human capital for the labor market. In the second period (adulthood), individuals either work for or own/manage a firm, according to the type of competences accumulated in childhood, earn the corresponding payoff (profit or wage) and consume. In addition, parents choose how children allocate their unit of time in acquiring managerial capital or general human capital and, therefore, their occupation in adulthood.

We model the firm as a license to operate a production technology (Caselli and Gennaioli, 2013). We assume that business licenses are freely available to individuals in a perfectly elastic supply, and firms are not endowed with any tradable asset. As a result, there is no market for firms' ownership: existing licenses (firms) in the hands

[4] By making the one-child assumption, we consciously ignore the important and complex effects that the size and structure of the family have on business succession, management practices and performance. For example, the bigger the family, the wider the pool of potential successors and the greater the chance of leaving the business leadership to a talented heir. However, as family size increases, the "productivity" of family name, reputation and contacts for doing business increases too. Moreover, personal and professional conflicts between family members tend to increase with family size, causing problems of ownership transfer and management inefficiencies (Bertrand et al., 2008; Ellul et al., 2010).

of parent entrepreneurs can be either transmitted to the heirs or canceled (shutting the firm down), while new licenses are accessible at no cost to workers' descendants. The possibility of trading licenses between (descendants of) entrepreneurs and workers in a market for firms is analyzed in Section 3.

2.1 Factors of production

In any period t, the economy is composed by a fringe of competitive firms n_t, which produce a single homogeneous good y_t. Firms are operated by a single manager, who is also the owner and residual claimant, using managerial capital with a limited span of control on human capital, the only variable factor of production:[5]

$$y_t^i = A_t m_t^i \left(H_t^i\right)^{1-\alpha}, \tag{1}$$

where m_t^i indicates the managerial capital of firm i, H_t^i the efficiency units of human capital, A_t the aggregate technology of the economy, with $0 < \alpha < 1$.

Taking the wage rate w_t as given, entrepreneurs choose the quantity of efficiency units of human capital so as to maximize profits:

$$\max_{H_t^i \geq 0} \pi_t^i = A_t m_t^i \left(H_t^i\right)^{1-\alpha} - w_t H_t^i. \tag{2}$$

The conditional demand function of human capital for firm i is therefore

$$H_t^i = \left(\frac{(1-\alpha) A_t m_t^i}{w_t}\right)^{1/\alpha}. \tag{3}$$

Substituting (3) in (2), the profits of an entrepreneur with managerial capital m_t^i are

$$\pi_t^i = \pi_t \left(m_t^i\right)^{1/\alpha}, \tag{4}$$

where $\pi_t = \left(\theta A_t / w_t^{1-\alpha}\right)^{1/\alpha}$, with $\theta \equiv \alpha^\alpha (1-\alpha)^{1-\alpha}$, are the profits per efficiency unit of managerial capital, that depend positively on the level of the aggregate technology and negatively on the wage rate.

2.1.1 Managerial capital For newly founded enterprises, the managerial capital is made by the entrepreneurial human capital of the founder, accumulated through formal schooling. By contrast, the managerial capital of the family firm is affected not only by the entrepreneurial human capital of the family member called to the helm of company, but also by the family specific human capital inherited by his/her family. Many

[5] The possibility of hiring professional managers is considered in Section 3.2. Following Lucas (1978), physical capital can be introduced without affecting the qualitative results of the model by assuming a small open economy with perfect capital mobility and no financial frictions.

studies have documented the critical role played, today as in the past, by the family legacy and interpersonal ties between the family members and prominent families in the business or political community to gain special access to resources and manage the family business effectively (Fisman, 2001).[6]

In modeling managerial capital, we allow for three distinctive features characterizing the managerial value of family specific human capital. First, family specific human capital pertains to the family more than to the firm and cannot be easily transferred to unrelated people outside the family. In Japan, for example, a common strategy used by the longest-running family businesses to displace least talented heirs without squandering the value of family name, legacy and contacts is the inclusion of non-blood heirs in the family through the adoption of an adult son or arranged marriage (Mehrotra et al., 2013; Bunkanwanicha et al., 2013). Consistent with the family specific human capital being linked to family ownership, Chung and Luo (2013) find that Taiwanese firms appointing a new CEO external to the controlling family improve their financial performance only if the share of family ownership (and, hence, the importance of family specific human capital) is low, while family ownership tends to be beneficial when the successor is a family member. Second, the managerial value of family specific human capital is not simply passed on to descendants, but it is acquired by the latter by spending time and resources in apprenticeships and on-the-job training, and by absorbing the family business culture and contacts (Lindquist et al., 2015). Third, anecdotal evidence indicates that the contribution of family specific human capital to the managerial capital of the firm is partially insensitive to the identity and innate talent of the descendant called to the helm of the company.[7] In this view, besides contributing to expand learning opportunities of family members through the transfer of tacit knowledge and entrepreneurial values and attitudes (Doepke and Zilibotti, 2008), family specific human capital act as a sort of income insurance in favor of family members who, independent of their innate ability, have access to the name, reputation and contacts of the family to manage the family business and sustain profits.

For expositional simplicity, we assume that the contributions of entrepreneurial and family specific human capital to managerial capital are perfectly separable and that the latter is unaffected by the innate talent of the family member leading the company.[8]

[6]Consistent with the managerial value of family specific human capital, companies managed by dynastically-promoted CEOs maintain more stable and effective labor relations with employees than non-family firms (Sraer and Thesmar, 2007; Mueller and Philippon, 2011), and dynastically-promoted CEOs are more likely among firms whose founder has been involved in politics (Xu et al., 2015).

[7]To illustrate, when Toyota Motor Corporation was hit by a series of scandals relating to the safety of its vehicles, the company soon announced that a member of the Toyoda family after more than fifteen years would return to the helm, relying on the Toyodas' reputation and name more than on the specific entrepreneurial skills of the new leader (Bennedsen and Fan, 2014, p. 32).

[8]In Appendix D we show that our results are robust to more general functional forms for managerial capital that also account for the possible complementarity between entrepreneurial and family specific human capital, as well as for the possibility that the family specific human capital contributes to enhance the entrepreneurial human capital of family members.

Formally, the managerial capital of individual i of generation $t+1$ is given by:

$$m_{t+1}^{i} = \tau_{t+1}^{i} a_{t+1}^{i} + \iota \left(1 - \tau_{t+1}^{i}\right) \Phi_{t+1} \left(\phi, g_{t+1}\right), \tag{5}$$

where ι is an indicator function assuming the value one if the parent is an entrepreneur and zero if he/she is a worker, τ_{t+1}^{i} and $1 - \tau_{t+1}^{i}$ are, respectively, the fraction of time spent by individuals in childhood accumulating entrepreneurial and family specific human capital, and Φ_{t+1} indicates the managerial productivity of the family specific human capital.

Entrepreneurial human capital refers to the managerial capital accessible to all entrepreneurs and managers according to their own specific personality and talent, including the capacity to create connections to capture valuable information on market and technology prospects. By contrast, accessibility to the family specific human capital introduces a competitive advantage for firms owned and managed by founders' descendants as opposed to newly founded firms. The managerial productivity of family specific human capital Φ is influenced exogenously by the socio-cultural arrangement of society and the relevance that it attributes to family legacy and contacts for doing business, captured by the parameter $\phi \geq 0$, with $\Phi_{\phi} > 0$ and $\Phi(0, g) = 0$, such that $\phi = 0$ indicates a society in which the family specific human capital has no influence on family firms' managerial capital. Besides, the productivity of family specific human capital depends endogenously on the growth rate of aggregate technology g_{t+1}. The idea is that the contribution of the family specific human capital to family firms' management is subject to an erosion effect due to the technological dynamism of the economy, which weakens the insurance value of family name and inherited connections by restricting the intergenerational transmission of society-specific family benefits (Galor and Moav, 2000; Hassler and Mora, 2000; Ashraf and Galor, 2011). In societies where new technologies are introduced at a high pace, the managerial value of the family specific human capital deteriorates more rapidly than that of entrepreneurial human capital because of the continuous update of the individuals' skills through formal schooling. Hence, the transfer of family reputation and contacts across generations becomes a less critical factor for doing business. This is consistent with recent empirical evidence provided by Giuliano and Nunn (2017) who find that practices inherited from previous generations are relatively more beneficial in more stable societies. Without any loss of generality, throughout this paper we shall consider the following special functional form for the productivity of the family specific human capital:

$$\Phi_{t+1} = \phi \left(1 - g_{t+1}\right). \tag{6}$$

Moreover, we assume that the productivity that society attributes to the family specific human capital is not extremely high, such that in a stagnant economy their contribution to managerial capital is not always greater than the marginal contribution of the

entrepreneurial human capital, whatever the innate talent of the heir:

Assumption 1. $\phi < 1$.[9]

2.1.2 General human capital Alternatively, individuals can spend their endowment of time in childhood accumulating general human capital, which depends on their innate ability. Although the family specific human capital may also have a value outside family firms, to the extent that the additional benefits of the family specific human capital in the labor market are lower than their managerial value, without loss of generality we normalize the value of the family specific human capital in the labor market to zero. To keep the analysis as simple as possible we assume that the impact of time on general human capital is the same as that on entrepreneurial human capital:

$$h^i_{t+1} = a_{t+1}. \tag{7}$$

2.2 Preferences and occupational choices

Parents have log-linear, altruistic preferences over the second-period household consumption c^i_t, and the future income of their children I^i_{t+1}:

$$u^i_t = \gamma \ln c^i_t + (1-\gamma) \ln I^i_{t+1}. \tag{8}$$

Parents choose occupation and education time investment of their children, after observing their innate abilities.[10] Entrepreneurs decide whether to continue the firm within the family, leaving the control to their heirs, or to shut the firm down. Correspondingly, their descendants accumulate either managerial, in the form of entrepreneurial and family-asset upbringing, or general human capital. Conversely, parent workers choose between the entrepreneurial and wage-earning career for their children, who, having no family specific human capital to inherit, can only accumulate entrepreneurial or general human capital.

2.2.1 Entrepreneurs Conditional on choosing to continue the firm within the family, parent entrepreneurs establish how descendants share their time endowment in childhood between the accumulation of entrepreneurial human capital and assimilation of family specific human capital with the objective to maximize the profit-income in adulthood, $\pi_{t+1}(m^i_{t+1})^{1/\alpha}$. Given the assumption of perfect substitutability between entrepreneurial and family specific human capital, from equations (4) and (5) we have

[9] The case $\phi \geq 1$ is analyzed in Appendix B.

[10] This simplifying assumption undervalues the insurance effects of the family specific human capital and, if something, it goes against our theory. Actually, if parents had to choose the education and occupation of the children before knowing their talent, the time spent in absorbing the family specific human capital could be a sort of insurance policy that is more valuable as more risk-averse parents are.

the following optimal allocation of time:

$$\tau_{t+1}^{i} = \begin{cases} 0 & \text{if} \quad a_{t+1}^{i} < \bar{a}_{t+1} = \phi\left(1 - g_{t+1}\right) \\ 1 & \text{if} \quad a_{t+1}^{i} \geq \bar{a}_{t+1} = \phi\left(1 - g_{t+1}\right). \end{cases} \tag{9}$$

Entrepreneurs' heirs invest their time in acquiring either entrepreneurial or family specific human capital according to whether their innate talent (i.e., the marginal productivity of entrepreneurial human capital) is higher or lower than the marginal productivity of the family specific human capital, $\phi\left(1 - g_{t+1}\right)$. From (4), the income that descendants can gain from continuing the family business is

$$I_{e,t+1}^{i,e} = \begin{cases} \pi_{t+1}\left(\phi\left(1 - g_{t+1}\right)\right)^{1/\alpha} \equiv I_{\phi,t+1}^{i,e} & \text{if} \quad a_{t+1}^{i} < \bar{a}_{t+1} \\ \pi_{t+1}\left(a_{t+1}^{i}\right)^{1/\alpha} \equiv I_{a,t+1}^{i,e} & \text{if} \quad a_{t+1}^{i} \geq \bar{a}_{t+1}, \end{cases} \tag{10}$$

where the superscript and subscript indicate, respectively, the occupation of the parent and the occupational choice for the heirs ('e' for entrepreneur and 'ω' for worker).

If parent entrepreneurs choose not to continue the firm, the income of descendants is given by the wage rate earned on the labor market times the human capital accumulated in childhood. From (7),

$$I_{\omega,t+1}^{i,e} = w_{t+1} a_{t+1}^{i}. \tag{11}$$

Parent entrepreneurs leave the firm to the heirs within the family or initiate their descendants to a wage-earning career according to whether $I_{e,t+1}^{i,e} \gtrless I_{\omega,t+1}^{i,e}$. Let a_{t+1}^{ϕ} and a_{t+1}^{a} be the levels of the descendant's innate ability for which the wage income is equal to the profit income that could be earned by managing the firm by relying on, respectively, family specific and entrepreneurial human capital. From (10) and (11),

$$a_{t+1}^{\phi} = \left[\frac{\phi\left(1 - g_{t+1}\right)\theta A_{t+1}}{w_{t+1}}\right]^{\frac{1}{\alpha}}, \tag{12}$$

$$a_{t+1}^{a} = \left(\frac{w_{t+1}}{\theta A_{t+1}}\right)^{\frac{1}{1-\alpha}}. \tag{13}$$

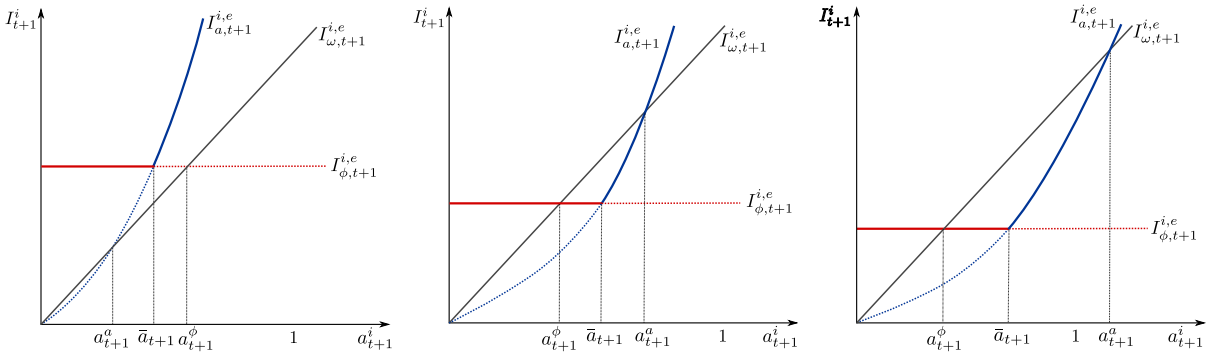
The ability thresholds (12) and (13) vary with the wage rate: the higher the income that descendants can earn on the labor market, the lower the incentive of parent entrepreneurs to transmit the firm within the family and the lower the threshold a_{t+1}^{ϕ} and the higher a_{t+1}^{a}. Therefore, we can define two relevant wage thresholds:

$$\hat{w}_{t+1} = \theta A_{t+1}[\phi(1 - g_{t+1})]^{1-\alpha}, \tag{14}$$

$$\tilde{w}_{t+1} = \theta A_{t+1}, \tag{15}$$

as, respectively, the wage rate $\hat{w}_{t+1}$ for which $a_{t+1}^{\phi} = a_{t+1}^{a} = \bar{a}_{t+1}$ and the wage $\tilde{w}_{t+1}$ for

Figure 2: Entrepreneurs' occupational choice



(a) $w_{t+1} < \hat{w}$ (b) $\hat{w} \leq w_{t+1} \leq \tilde{w}$ (c) $w_{t+1} > \tilde{w}$

which $a^a_{t+1} = 1$. Summarizing:

Proposition 1. *Education and occupational choices of parent entrepreneurs are such that:*

(a) for any $w_{t+1} \leq \hat{w}$, all the descendants continue the family firms. Heirs with ability $a^i_{t+1} < \bar{a}_{t+1}$ acquire and use the family specific human capital in the firm's management; heirs with abilities $a^i_{t+1} \geq \bar{a}_{t+1}$ accumulate and use entrepreneurial human capital;

(b) for any $w_{t+1} \in (\hat{w}, \tilde{w}]$, the descendants with intermediate innate abilities, $a^i_{t+1} \in (a^\phi_{t+1}, a^a_{t+1})$, become workers, while the others continue the family firms. Low ability heirs, with $a^i_{t+1} \leq a^\phi_{t+1}$, acquire family specific human capital and use crony management technologies, while highly talented ones, with $a^i_{t+1} \geq a^a_{t+1}$, invest in entrepreneurial human capital and use entrepreneurial management technologies;

(c) for any $w_{t+1} > \tilde{w}$, low ability heirs for whom $a^i_{t+1} \leq a^\phi_{t+1}$, continue the family firms by exploiting the family specific human capital. All the others become workers.

In Figure 2 we provide a graphical representation of the occupational choice of parent entrepreneurs. When the market wage is low (panel 2(a)), the option of the employment sector is unattractive; parent entrepreneurs will never shut their firms down, and the control of all the firms in the economy is retained within the family. For intermediate wage rates, a polarization of family firms in terms of talent and quality of management practices emerges (panel 2(b)): heirs with an innate ability lower than a^ϕ_{t+1} as well as heirs with an ability level higher than a^a_{t+1} continue the family business, while those with an ability level $a^i_{t+1} \in (a^\phi_{t+1}, a^a_{t+1})$ leave the family business to work for a wage. In this case, low ability agents would earn a wage on the labor market lower than the profits they gain by managing the firm by relying on family name and contacts. Conversely, high ability heirs are selected by their parents to continue the family business by using the best management practices. Finally, for high wage rates, only descendants in the lower tail of the ability distribution (i.e., $a^i_{t+1} \leq a^\phi_{t+1}$) continue the firm by exploiting the family specific human capital, while all the others will leave

the company to join the employment sector (panel 2(c)).[11]

2.2.2 Workers Unlike parent entrepreneurs, workers do not have family specific human capital to transfer to their descendants. Their descendants can only accumulate entrepreneurial human capital needed for managing a new enterprise or general human capital to work for a wage. As a result, education and occupational choices of parent workers are regulated only by the ability of their descendants. Specifically, from (7), (8) and (4):

$$I^{i,\omega}_{e,t+1} = \pi_{t+1}\left(a^i_{t+1}\right)^{1/\alpha}, \tag{16}$$

$$I^{i,\omega}_{\omega,t+1} = w_{t+1}a_{t+1}. \tag{17}$$

Comparing (16) and (17), the relevant threshold level of talent which makes workers' descendants indifferent between wage-earning and entrepreneurial career is a^a_{t+1} as in (13).

Proposition 2. *Education and occupational choices of parent workers are such that:*

(a) for any $w_{t+1} \leq \tilde{w}$, high ability descendants, with $a^i_{t+1} \geq a^a_{t+1}$, accumulate entrepreneurial human capital and found new firms, while the low ability ones, with $a^i_{t+1} < a^a_{t+1}$, become workers;

(b) for any $w_{t+1} > \tilde{w}$, all descendants become workers, regardless of their innate ability.

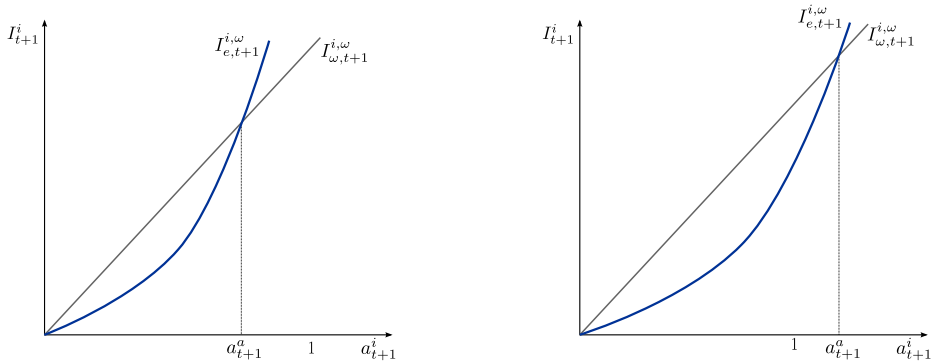
Figure 3 displays the occupational choice of parent workers. When the market wage rate is low, the employment sector is unattractive to highly talented descendants who may earn a higher income by starting and managing an individual firm (panel 3(a)). In contrast, when the market wage rate is very high, working for a wage is the most rewarding option for workers' descendants whatever their innate talent (panel 3(b)).

2.3 Macroeconomic equilibrium

In this section we characterize the macroeconomic equilibrium, in terms of aggregate technology, industry size, quality of management practices and the economy's growth rate. In order to do that, let us start by describing the evolution of total factor productivity.

[11] If we assume that entrepreneurship is more risky than wage employment and low quality entrepreneurs are more likely to go bankrupt, the role of family specific human capital could be weaker. However, the insurance nature of the family specific human capital, besides supporting income, can also limit the probability of going bankrupt. In this case, it is still more rewarding for the least talented heirs to continue the family business rather than work in the labor market.

Figure 3: Workers' occupational choice



(a) $w_{t+1} < \tilde{w}$ (b) $w_{t+1} > \tilde{w}$

2.3.1 Technology growth We assume that the aggregate technology evolves over time according to the fraction of entrepreneurs in the economy that accumulates entrepreneurial human capital.[12]

$$A_{t+1} = \left(1 + \mathcal{N}^a_{t+1}\right) A_t. \tag{18}$$

As the talent threshold a^a_{t+1} above which descendants accumulate entrepreneurial human capital is the same regardless of the parents' occupations, the growth rate of total factor productivity is:

$$g_{t+1} = 1 - a^a_{t+1}\left(n_t\right). \tag{19}$$

This assumption is in line with growth theories and empirical evidence highlighting the critical role of allocation of individual talents to entrepreneurial rather than rent-seeking activities (Hassler and Mora, 2000; Galor and Michalopoulos, 2012). In addition, it greatly simplifies algebra, allowing us to prove:

Lemma 1. *In equilibrium, $w_{t+1} > \hat{w}$ holds: not all entrepreneurs' descendants continue the family firms, and some of them work for a wage.*

According to Lemma 1, the occupational choice in Proposition 1(a) is inconsistent with the labor market equilibrium, and the economy is characterized by positive entry and exit of firms and a certain degree of social mobility.

2.3.2 Labor market equilibrium Using equations (3), (5) and (7), and integrating the optimal choices of the parents over the innate ability distribution of the descendants, the aggregate supply and demand of general human capital are:

$$H^S_{t+1}\left(w_{t+1}\right) = \int_{\mathcal{W}} h^i_{t+1} da^i_{t+1} = \int_{\mathcal{W}} a^i_{t+1} da^i_{t+1} \tag{20}$$

[12] This excludes scale effects on the economy growth rate. Results are qualitatively robust if we assume that the growth rate depends on the total amount of entrepreneurial human capital (see Appendix C).

and

$$H_{t+1}^{D}\left(w_{t+1}\right)=\int_{\mathcal{N}} H_{t+1}^{i} da_{t+1}^{i}=\int_{\mathcal{N}}\left(\frac{\left(1-\alpha\right) A_{t+1} m_{t+1}^{i}}{w_{t+1}}\right)^{1/\alpha} da_{t+1}^{i}, \tag{21}$$

where $\mathcal{N}$ and $\mathcal{W}$ are the relevant sets of firms and workers at time $t+1$ reflecting the occupational choices of parents at time t.

Proposition 3. *For any n_t, a unique competitive equilibrium exists, defined by the tuple $\left\{w_{t+1}, H_{t+1}^{S}, H_{t+1}^{D}\right\}$ for which $H_{t+1}^{S}\left(w_{t+1}\right)=H_{t+1}^{D}\left(w_{t+1}\right)$. The equilibrium wage rate w_{t+1} is a one-to-one function of the number of firms operating in the previous generation, n_t.*

The equilibrium wage rate in $t+1$ varies with the number of firms operating in the previous period/generation t. This is due to the heterogeneity of parents associated to the possibility of transmitting family specific human capital. The higher the number of firms in t, the higher the number of parent entrepreneurs who can transmit family specific human capital to their descendants in $t+1$. This induces some low-talented individuals, who, lacking family specific human capital, would have chosen to work for a wage, to continue the family firm, thus causing an increase in labor demand and a decrease in labor supply, and therefore an increase in the wage rate. Since occupational choices are regulated by the number of firms operating in t that in turn determines the number of firms in $t+1$, the characterization of the steady state equilibrium would require to take into account their joint evolution. The one-to-one relation between w_{t+1} and the number of firms in t greatly simplifies the analysis by allowing the wage thresholds in (14) and (15) to be matched to the correspondingly one-period lagged threshold numbers of firms $\hat{n}_t$ and $\tilde{n}_t$.

2.3.3 Steady-state equilibrium From Proposition 3 and Lemma 1, the dynamic system governing the evolution of the industry size is given by the piecewise differential equation:

$$n_{t+1}=\begin{cases} n_t a_{t+1}^{\phi}(n_t)+1-a_{t+1}^{a}(n_t) & \text{if} \quad n_t<\tilde{n} \\ n_t a_{t+1}^{\phi}(n_t) & \text{if} \quad n_t\geq\tilde{n}, \end{cases} \tag{22}$$

where $\tilde{n}$ is the number of firms for which the equilibrium wage rate is $\tilde{w}$ and $a^a=1$. The corresponding evolution of the growth rate of aggregate technology is:

$$g_{t+1}=\begin{cases} 1-a_{t+1}^{a}(n_t) & \text{if} \quad n_t<\tilde{n} \\ 0 & \text{if} \quad n_t\geq\tilde{n}. \end{cases} \tag{23}$$

A steady-state equilibrium is defined as a stationary solution to the dynamic equation (22), in which firms and individuals maximize their objective functions and markets clear.

Definition 1. *A sequence* $\{w_t, n_t, a_t^{\phi}, a_t^{a}, g_t\}_{t=\kappa}^{\infty}$ *is a steady state equilibrium if: (i) firms maximize profits; (ii) parents choose the occupation and education of descendants that maximize utility; (iii) the labor market clears; (iv) ability thresholds, number of firms and technology growth rate are constant over time.*

Using this definition, we can prove that our economy is characterized by a unique and globally stable steady-state equilibrium.

Proposition 4. *The number of firms monotonically converges to a unique and globally stable steady state*

$$n^* = \frac{1 - a^a(n^*)}{1 - a^{\phi}(n^*)}, \tag{24}$$

where $n^* \in [0, \tilde{n}]$ *such that the distribution of individuals' talent across occupations and management practices are those described in propositions 1(b) and 2(a). At the steady state, the growth rate of aggregate technology is*

$$g^* = 1 - a^a(n^*). \tag{25}$$

The steady-state equilibrium is characterized by a polarization of the distribution of individual abilities of the heirs succeeding to the helm of the family firms and of the managerial practices deployed to lead the family business, and by a positive rate of social mobility between labor and industry, $n^*(a^a(n^*) - a^{\phi}(n^*))$. A share $\nu_{f,\phi} = a^{\phi}(n^*)$ of the industry is populated by family firms run by low-ability descendants who rely on the managerial productivity of family specific human capital inherited from their parents, while a share $\nu_{f,a} = 1 - a^a(n^*)$ is made up by well-managed family firms conducted by highly talented descendants who use the entrepreneurial human capital accumulated in childhood. On the other side, a share $\nu_{nf} = (1 - n^*)(1 - a^a(n^*))/n^*$ of new, non-family firms founded by workers' descendants enters the industry by using entrepreneurial management practices. In terms of quality of management practices and performance, newly founded and well managed family firms are indistinguishable. However, the average performance of family firms is lower than that of non-family ones due to the bias in the allocation of talent caused by the income-insurance effect of the family specific human capital.

Ultimately, educational and occupational choices of parents, as well as industry structure, growth rate of technology and income per capita, depend on the socio-cultural and institutional structure of society affecting the managerial value of the family specific human capital ϕ.

Proposition 5. *The steady-state talent thresholds* $a^{\phi}(n^*)$ *and* $a^a(n^*)$ *increase with* ϕ*. As a result, the share of family firms managed using family specific human capital increases, while that using entrepreneurial human capital and the growth rate decrease. In addition, the variance of management quality of family firms and the social mobility rate decrease as* ϕ *increases.*

The importance that the socio-cultural setting of society attaches to family name, values and contacts in business life has both direct and general equilibrium effects on the allocation of talent and economic development. Where family specific human capital is highly valued for doing business, entrepreneurs are more likely to maintain the control of the firms within the family by transferring the family specific human capital to their low-ability heirs. This increases the number of firms in the market, the labor demand and the wage rate, thus discouraging highly talented individuals from accumulating entrepreneurial human capital. The resulting decrease in the rate of technological progress further increases the productivity of family specific human capital, making it relatively more rewarding to acquire and use family specific rather than entrepreneurial human capital. Ultimately, the share of badly managed family firms increases, while those of well managed family and non-family firms using entrepreneurial managerial practices decrease. Such changes in the allocation of talents reduce the entrepreneurial human capital and the steady-state growth rate of the economy.[13]

A specific result of the insurance nature of the family specific human capital, reported in Proposition 5, is that the variability of quality of management practices across family firms decreases with the productivity of family specific human capital. The intuition is transparent. In societies where the family name, reputation and contacts allow low-ability heirs to continue the family company (relatively) successfully, the share of family firms using family-based management practices, whose productivity is independent of entrepreneurial ability, increases, while the share of family firms using entrepreneurial human capital decreases. As a result, the distribution of quality of management practices across family firms has a lower variance and a fatter left tail.

2.4 Family firms in the development process

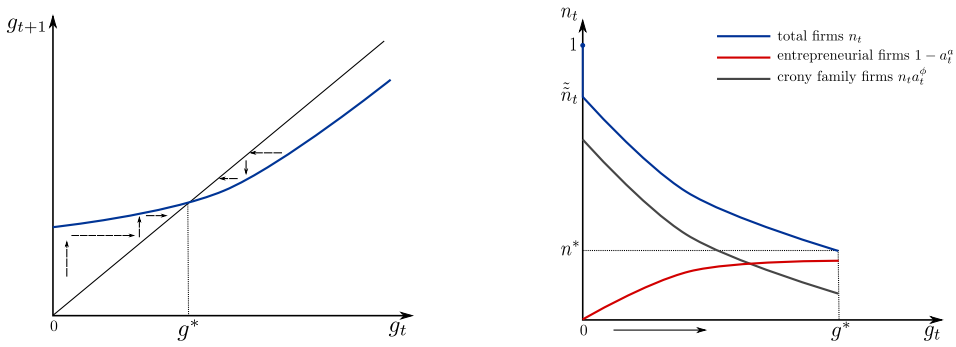
As a preliminary step to analyze the evolution of family firms and industry structure in the transition from stagnation to growth, we reformulate the economy's dynamics in terms of growth rates in the following proposition.

Proposition 6. *For any $n_t < \tilde{n}$ there is a one-to-one inverse correspondence between g_t and n_t, and the growth rate of aggregate technology evolves monotonically toward the steady state according to $g_{t+1} = v(g_t)$, with $0 < \partial g_{t+1}/\partial g_t < 1$. For any $n_t \geq \tilde{n}$ the economy is stagnant, $g_{t+1} = g_t = 0$. There exists an $\tilde{\tilde{n}} < \tilde{n}$ such that for $n_t = \tilde{\tilde{n}}$ the economy experiences a managerial and technological take-off, with $g_{t+1} > g_t = 0$ and $a^a_{t+1} < 1$.*

The growth dynamics is associated with an evolution of industry for which, along the transition path, the number of firms in the economy steadily decreases, while their

[13] When the productivity of the family specific human capital is extremely high, $\phi \geq 1$, all family businesses use "crony" management practices, there is no firm entry and no social mobility, and the economy is stagnant at a zero growth rate (Appendix B).

Figure 4: Growth and firm transition



(a) Growth dynamics (b) Firms' evolution

average size increases (Figure 4). Consistent with the traditional boost-retardation role of family firms, in the early stages of development, when the economy is still stagnant, the industry is populated by a large number of small family firms, which rely on the influence of the family name and contacts to manage their businesses and sustain productivity. Because of high wages, some family firms shut down, while those which remain in the market increase their size. When the number of firms shrinks to $\tilde{\tilde{n}}$, and the firms' average size has reached a minimum threshold level, it becomes profitable for individuals at the top of the ability distribution to adopt more efficient managerial practices and accumulate entrepreneurial human capital. The economy experiences a managerial and technology take-off triggered by a new fringe of well managed enterprises conducive to innovation and economic growth.

From this moment on, a process of structural transformation of industry starts, such that traditional family firms relying on family specific human capital are replaced by entrepreneurial family and non-family firms that foster advancements in technology and social mobility. The increasing dynamism of the economy and society weakens the income-insurance effect of the family specific human capital. This decreases the productivity of traditional management practices and, as a result, increases the supply of labor, decreases the wage rate and makes it rewarding for highly talented individuals to invest their time in accumulating entrepreneurial human capital. Due to the reallocation of talents and resources across occupations and management technologies the share of family firms in the economy decreases, while their heterogeneity increases.

Proposition 7. *Along the transition to the steady state, the shares of family and non-family firms using entrepreneurial human capital increase and the share of family firms using family specific human capital decreases. In addition, the total share of family firms decreases, while the variance in the quality of management practices of family firms increases.*

In the early stages of development, family specific human capital is an important source of productivity for family firms and the economy. However, in later stages, the name, legacy and web of contacts of the family, while remaining valuable assets

at the firm level generate negative selection effects on talent allocation, occupational choices and management practices at the aggregate level, transforming them into a hurdle for innovation and growth. This dual role of the family specific human capital can cause a "reversal of fortune" for countries that are rich in the short run because of the high productivity of family specific human capital, and become relatively poor in the long run because of the distortionary impact of family specific human capital on entrepreneurial human capital accumulation.

Proposition 8. *In the early stages of development (i.e., $n_t \geq \tilde{n}$), the income per capita is increasing in ϕ. However, the greater the managerial productivity of the family specific human capital, the later the managerial take-off and the lower the growth rate.*

Proposition 8 illustrates that in pre-industrialization stages, a large share of family firms supported by stronger productivity of family specific human capital can sustain the income of the economy, at the cost of delaying the adoption of more efficient management practices and weakening the long-run prospects of the economy.

3 Markets for firms and managers

So far, we have assumed that parent entrepreneurs can choose between leaving the firm leadership to descendants or closing the family business down and directing their descendants to a wage-earning career. In reality, family firms are often sold and/or managed by professional CEOs hired from outside the family. This gives entrepreneurs the opportunity to leave to their untalented heirs the proceeds of the firm's sale or dividends produced by professional managers, which add to the wage that heirs can earn in the labor market.

In this Section, we introduce in the model markets for firms and managers, conceptualizing firms as homogeneous licenses that can be exchanged in the market and assuming that each individual can own at most one license (i.e., firm). We abstract from the existence of the capital market and assume that the new potential entrepreneurs (i.e., the workers' descendants starting a new business) can purchase the business licenses from entrepreneurs' descendants and pay for it ex post out of realized profits.[14] In this case, unless the managerial value that society attributes to the family specific human capital is very low, parent entrepreneurs can still prefer to transfer the business within the family also to poorly talented heirs exploiting family specific human capital

[14] In Appendix E, we consider the case in which the licenses must be paid in advance by workers' descendants, who can use monetary bequests left by parents and financial resources raised in the capital market. In this setting, as long as capital markets are complete, the initial distribution of parental wealth does not affect occupational choices and therefore the aggregate equilibrium, which are qualitatively the same as in the basic model when we abstract from capital markets. By contrast, under imperfect capital markets, the initial wealth of parent workers influences the decisions on the descendants' careers. However, the introduction of this additional source of advantage for family firms simply exacerbates the misallocation of talents induced by the family specific human capital, leaving our results qualitatively unchanged.

rather than selling the firm. Then, we allow for the possibility of entrepreneurs continuing the firm by leaving the leadership to professional managers external to the family. In this case, family firms hiring professional managers use entrepreneurial human capital and are equally well managed as non-family firms, while family firms conducted by family members divide between badly and well managed firms as in the basic model.

3.1 Market for firms

To highlight the main economic mechanisms in the simplest and analytically tractable model, we do not allow for the creation of new businesses, but we assume that business licenses are in a fixed number n, hence removing any dynamics from the analysis.[15]

As an alternative to continuing the firm within the family ensuring their descendants the income $I_e^{i,e} = \pi(m^i)^{1/\alpha}$, parent entrepreneurs can sell the firm at a price p and transfer the proceeds to their heirs, whose total income in adulthood is given by the wage income plus the proceeds of the sale, $I_\omega^{i,e} = w\,a^i + p$. By contrast, in order to start up a new enterprise workers' descendants have to buy a license from existing entrepreneurs. In line with our main hypothesis that the family specific human capital can be transferred only to a lesser extent to buyers or managers external to the family, we assume that new entrepreneurs cannot manage the firms by exploiting the family specific human capital of the selling family such that their entrepreneurial income is $I_e^{i,\omega} = \pi(a^i)^{1/\alpha} - p$. Otherwise, they can undertake a wage-earning career gaining the wage income $I_\omega^{i,\omega} = wa^i$.

The occupational choices of parent entrepreneurs are governed by the descendants' innate ability and by the two thresholds a^ϕ and a^a for which the total income that the latter can realize by working for a wage and inheriting the proceeds from the firms' sale is equal to the income that they can earn by managing the family firm by using, respectively, family specific or entrepreneurial human capital:

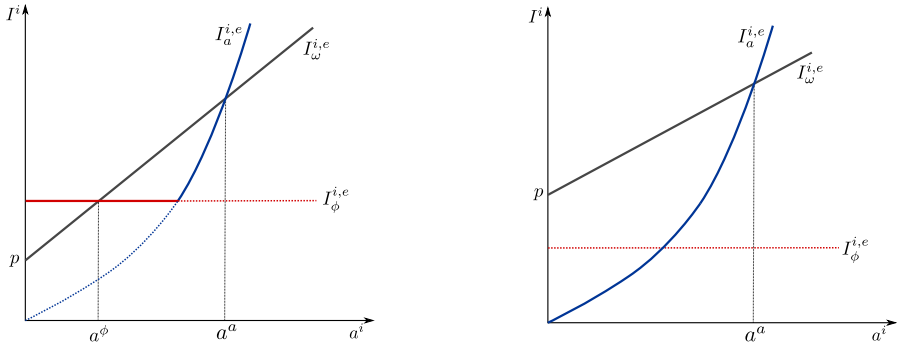
$$a^\phi = \frac{\pi\left(\phi(1-g)\right)^{1/\alpha} - p}{w}, \tag{26}$$

$$\pi\left(a^a\right)^{1/\alpha} = wa^a + p. \tag{27}$$

As in the basic model, parent entrepreneurs choose to keep the ownership of the firm within the family as long as the heirs' ability is either lower than a^ϕ or higher than a^a. Likewise, workers' descendants join the labor market as employees or start a new business by purchasing a license depending on whether their wage income $I_\omega^{i,\omega}$ is greater or lower than the entrepreneurial income $I_e^{i,\omega}$. The occupational choice of parent workers is then governed by the indifference threshold a^a in (27), such that workers' descendants with ability level $a^i < a^a$ join the labor market, while the most talented

[15] Given the static nature of the analysis, we drop the time indicator as long as it does not generate confusion.

Figure 5: Equilibrium: family firms continuation



(a) Polarization ($\phi > \underline{\phi}$)

(b) Selling crony firms ($\phi \leq \underline{\phi}$)

with $a^i \geq a^a$ buy a business license and start a new enterprise.

Since, the number of business licenses (firms) is fixed, the equilibrium is defined as the pair of non-negative prices (w^*, p^*) such that: (i) parents optimally choose the occupations for descendants; (ii) firms maximize profits, and (iii) labor and firm-ownership markets clear. We focus on equilibria with positive exchanges of licenses, omitting the analysis of deeply crony societies in which all firms are transferred within the family (formally, we assume $\phi < 1$).

Proposition 9. *A unique equilibrium with a positive growth rate exists. There exists an $\bar{n} > 0$ such that for any $n < \bar{n}$, the equilibrium is characterized by a positive price for business licenses $p^* > 0$. Moreover, for any $p^* > 0$, there exists a $\underline{\phi} \in (0, 1)$ such that:*

(a) if $\phi > \underline{\phi}$, the share of family firms $n\,(a^a - a^\phi)$ is sold to entrant entrepreneurs (i.e. workers' descendants); family firms that continue by the next generation polarize into badly managed firms conducted by low-talented heirs relying on family specific human capital, and well managed firms conducted by high-talented heirs using entrepreneurial human capital;

(b) if $\phi \leq \underline{\phi}$, the share of family firms $n\,a^\phi$ is sold in the market, and all the family and non-family firms are managed by using entrepreneurial human capital.

The existence of a market for firms qualifies, but does not invalidate, the results of the basic model. In particular, in societies where family name, legacy and connections are valuable assets for managing a business, leaving the firm's ownership to low-talented descendants can still be the optimal choice for parent entrepreneurs (Fig. 5(a)). However, if ϕ is very low, the parents of untalented heirs prefer to sell the firm to new entrants and leave their descendants the proceeds (Fig. 5(b)). Therefore, in the presence of a market for firms the crony family firms can disappear when the managerial value of the family specific human capital is low but still positive (lower than $\underline{\phi}$), while in the basic setting without license exchanges $\underline{\phi}$ is normalized to zero.

The fundamental mechanism driving occupational choices is also unchanged: higher values of ϕ increase the managerial value of the family specific human capital and the

incentive to transfer the firm to the least talented heirs with depressing effects on the growth rate and the market for firms.

Proposition 10. *As ϕ increases, the share of family firms, and among these the proportion of those using bad management practices, increases, while the share of firms managed by entrepreneurial human capital, the growth rate of technology and the number of exchanges in the market for business licences decrease.*

Unlike the basic model, the number of firms is no longer an endogenous state variable determining the evolution of economy. Although we ruled out any dynamics, if we assume that at the initial stages of development the economy is populated by many small firms, the comparative statics analysis for n provides some indications on the role of family firms during the development process.

Proposition 11. *The threshold value of the productivity of family specific human capital $\underline{\phi}$ decreases with n. Moreover, for any $n < \bar{n}$, as n decreases, the share of family firms and the proportion of those using crony management practices decrease, while the share of firms managed by entrepreneurial human capital, the growth rate of technology and the share of firms exchanged in the market increase.*

In the first stages of development, when the economy is populated by a large number of small firms, the likelihood of firms continuing within the family by relying on the managerial value of the family specific human capital is great. The larger the number of firms, the lower the equilibrium price of firm ownership (Proposition 9), and the lower the incentive to sell the family business, including those managed by the least talented heirs. In addition, the larger n, the lower $\underline{\phi}$ and the higher the likelihood that the actual productivity of the family specific human capital is high enough to ensure that crony family firms persist in equilibrium. Consistent with the evolution of family firms described in Section 2.4, as firms become larger and fewer in number, the market for firms becomes more efficient. An increasing share of crony family firms is sold to new highly talented entrepreneurs replacing the least talented descendants of the current generation of entrepreneurs, and enhancing economic growth.

3.2 Market for managers

Assume that entrepreneurs can keep the ownership of the business within the family and leave its leadership to professional managers external to the family. Also, assume that the family specific human capital cannot be used outside the family by professional managers.[16] For the sake of tractability, we abstract from agency problems between owners and managers and other possible corporate governance frictions which would

[16] Alternatively, we could assume that the family specific human capital is in part linked to family ownership and in part to family management, and that the former can be transferred to professional managers. If we also assume that, due to organizational frictions, managing an enterprise as an external manager rather than as an owner reduces the productivity of entrepreneurial human capital, then the most tal-

introduce complex matching issues between (the ability of) external CEOs and family firms (Terviö, 2008). Therefore, profits of firms hiring non-family CEOs depend only on the entrepreneurial human capital of the latter.

Let d_j^i be the dividend paid by manager j to the family firm owner i. The total income of heirs of family firms hiring an external CEO is $I_{\omega,m}^{i,e} = wa^i + d_j^i$, while the total income of workers' descendants who manage a family firm is $I_m^{\omega} = \pi(a^j)^{1/\alpha} - d_j^i$. Parent entrepreneurs choose to hire a professional managers if the total income that they provide to heirs is at least equal to the income that they can give by selling the firm $wa^i + d_j^i \geq wa^i + p$. Likewise, the participation constraint for workers' descendants is that the net income that they gain by managing a family firm is at least equal to the income that they obtain by buying a business license, $\pi(a^j)^{1/\alpha} - d_j^i \geq \pi(a^j)^{1/\alpha} - p$. Hence, in equilibrium a market for managers opens only if $d_j^i = p$. Then, parent entrepreneurs are indifferent between selling the firm and hiring an external manager, while the talent thresholds a^{ϕ} and a^a below and above which they leave the firm management to family descendants are the same as in equations (26) and (27). Therefore:

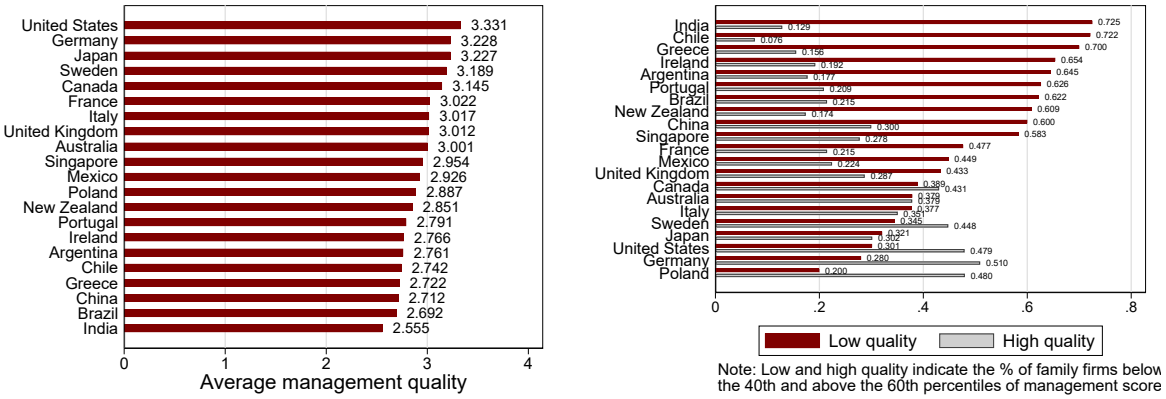
Proposition 12. *Family firms hiring professional managers use entrepreneurial human capital and are equally well managed as non-family firms. Family firms conducted by family members divide between badly and well managed firms according to the managerial value of the family specific human capital.*

4 Empirical evidence

In this section we provide a number of correlations consistent with the major predictions of our theory. First, family firms in the second generation or beyond have worse management practices than non-family firms. Second, the management quality gap between family and non-family firms is negligible in countries in which the value of the family name, legacy and contacts is low. Third, the management quality of family firms conducted by professional CEOs is indistinguishable from that of non-family firms, independent of cultural values prevailing in society. Fourth, in societies attaching higher values to family specific human capital, the fraction of badly (well) managed family firms is higher (lower), and the variability of family firms' management quality is lower. Finally, in countries which are not yet industrialized, collectivistic values are positively correlated with the average management quality of family firms, while they do not affect the overall distribution of management quality across family firms.

ented workers' descendants would have a stronger incentive to be employed as external managers rather than acquire a business license. However, the insurance effect of the family specific human capital for entrepreneurs' descendants would remain unaltered, and the possibility of a polarization equilibrium as well.

Figure 6: Management quality across countries



(a) Average management quality

(b) Percentage of family firms with high/low management quality

4.1 Data and variables

4.1.1 Management quality and family firms We draw data on the quality of management practices and firm ownership from the World Management Survey (WMS) by Nicholas Bloom, Raffaella Sadun and John Van Reenen. The data cover over 10,000 manufacturing firms, operating in 154 industrial sectors (3-digit US SIC 1987), across 21 countries over the period between 2001 and 2012[17]. The quality of management practices (*Management quality*) is measured by averaging the interview-based evaluations of 18 specific management practices employed by the firms, covering three key areas of business organization: performance monitoring, targets and incentives. To each managerial practice a score is assigned from 1 ("worst practice") to 5 ("best practice") and *management quality* is the firm average of each individual question score.

The survey provides information on the ownership structure of the firms, allowing us to define a dummy variable *Family firm*, which takes the value 1 for family firms and 0 otherwise. The WMS identifies family firms as those in which the descendants in the second generation or beyond from the founder are the largest shareholders with at least 25% of equity. In the non-family-firm category, we include all the types of private firms, while excluding government companies.

Figure 6 displays the cross-country variation in the average management quality (panel (a)) and in the distribution of management quality of family firms (panel (b)), as measured by the percentage of family firms below and above the 40th and 60th percentile of *management quality*. Less developed countries are characterized by a larger proportion of low-quality family firms and a smaller proportion of high-quality family firms than advanced economies. However, it is interesting that also in developed

[17]We thank the authors for sharing an extended version of their public datatset. For details on the survey and firm level variables, see Bloom et al. (2012) and Appendix F.1.

countries the share of family firms of low management quality is non-negligible.

4.1.2 Productivity of family specific human capital Our preferred (inverse) proxy for the productivity of family specific human capital is the index of individualism (*Individualism*) proposed by Hofstede et al. (2010). *Individualism* reflects "the degree to which individuals are integrated into groups. On the individualist side we find societies in which the ties between individuals are loose: everyone is expected to look after him/herself and his/her immediate family. On the collectivist side, we find societies in which people from birth onwards are integrated into strong, cohesive in-groups, often extended families (with uncles, aunts and grandparents) which continue protecting them in exchange for unquestioning loyalty" (Hofstede et al., 2010, p. 92). We expect the productivity of the family specific human capital to be higher in more collectivistic societies, where the transfer of family reputation and relationships is facilitated by cultural values supporting strong interdependence and cooperation among individuals belonging to the same social group.

Individualism ranges from 0 (strongly collectivistic) to 100 (strongly individualistic). It is computed for each country based on factor analysis of the mean scores to 14 survey questions about work goals. The common business culture of interviewees mitigates the concerns for possible frame of reference effects that affect cross country surveys asking for subjective scale scores.

This index has been recently used in the economic literature as the proxy that best captures the individualistic cultural dimension of society which more than others affects productivity, innovation capacity and economic growth (Gorodnichenko and Roland, 2011, 2017; Fogli and Veldkamp, 2018). In particular, van Hoorn (2014) finds that the degree of (Hofstede) individualism has a strong influence on firms' organization and management quality.

4.1.3 Other cultural and institutional variables Given the multifaceted nature of the family specific human capital, we take into account other variables commonly used in the literature to capture cultural and institutional features of society, which may be correlated with the value that family legacy and contacts have in the business life or confound the influence of the family specific human capital on the management quality of family firms.

First, we account for another variable that captures the extent to which individuals easily recognize and support each others within extended groups (*Freedom of choice*). It is computed from the WVS as the degree to which people feel that they have freedom of choice and the control of their own lives, hence characterizing individualistic attitudes (Alesina and Giuliano, 2015; Olsson and Paik, 2016; Tabellini, 2010). As we expect the productivity of family specific human capital to be higher in more collectivistic societies, *Freedom of choice*, likewise *Individualism*, should also be positively correlated

with the reduction in the management quality gap between family and non-family firms.

Besides the interdependence and strength of relationships between individuals and families in extended social groups, the cross-country variation in the management quality of family firms may be affected by the intensity of kinship ties within the same family, which influence the transmission of and the advantages gained from the family specific human capital (Bertrand and Schoar, 2006). To account for this possibility, we use the variable *Family ties (unimportance)*, which is measured as the first principal component from responses to three questions from the World Value Survey (WVS), concerning the importance of the family in the respondent's life, the duties and responsibilities of parents and children, and the love and respect for one's own parents (Alesina and Giuliano, 2010, 2014).

We also account for the possibility that the productivity of the family specific human capital and the firms' choice of management technology are affected by the quality of the institutional environment in which they operate. We account for *Institutional quality* which captures the functioning of institutions in terms of control of corruption, respect of the law and government efficiency. It is measured by the first principal component of the six indicators of the World Bank's Worldwide Governance Indicators (Kaufmann et al., 2010), with higher value indicating better functioning institutions. In addition, we include the variable *Barriers to entry index*, capturing the administrative and bureaucratic obstacles to starting and running businesses that is measured by the first principal component of seven indicators from the Doing Business dataset (World Bank). Finally, provided that the share and quality of family firms can be affected by the functioning of the financial sector, we account for *Financial development*, measured by the ratio between credit to private sector to GDP (World Bank).[18]

4.2 Econometric analysis

4.2.1 The management gap Our model predicts that there is a negative gap in the quality of management practices between family and non-family firms. This gap is larger in countries characterized by stronger collectivistic values where the importance of family name, reputation and relationships in the local culture is high, while it tends to disappear in more individualistic societies. To test these predictions, we estimate

$$Management\ quality_{isct} = \beta\ Family\ firm_{isct} + \eta\ Family\ firm_{isct} \times Individualism_c + \\ + X_{isct}\Phi + \alpha_c + \alpha_c\, t + \lambda_t + \mu_s + \varepsilon_{isct}, \tag{28}$$

[18]The details on source and construction as well as summary statistics of the variables are in Appendix F, where we also show that our results are robust to the use of other cultural and institutional variables such as trust, ethnic and linguistic fractionalization and family structure, executive constraints, legal origins and the single components of *Institutional quality* and *Barrier to entry index*.

where i is the firm, s the industry sector, c the country and t the time of the interview. X_{isct} is a vector of firm level controls drawn from the WMS that includes firm size, percentage of managers and non-managers with a college degree, percentage of managers who left the firm in the 12 months before the interview, a dummy for whether the firm is owned by a multinational, and a set of noise controls including interviewer dummies, tenure and seniority of interviewed managers, and day of month and month of the year dummies that help to improve the precision of the estimates by washing out part of the random measurement errors in the survey (Bloom et al., 2016). Finally, all regressions include country (α_c) and industry (μ_s) fixed effects, country-specific time trends $\alpha_c\, t$ and time dummies λ_t.[19]

Table 1 reports the regression results for the coefficients of interest, β and η, expecting the former to be negative and the latter positive. Columns (1) and (2) show that the coefficients for *Family firm* and its interaction with *Individualism* have the predicted signs, and are statistically significant. Family firms tend to be managed worse than non-family firms on average, but this gap is significantly smaller in individualistic societies where the productivity of family specific human capital is low, and disappears when the value of social connectivity has little importance in the local culture. In columns (3) through (7) we separately include the interaction terms between *Family firm* and the other country level cultural and institutional variables. In all specifications, coefficients for *Individualism* keep their statistical significance and magnitude, while coefficients for other interactions are non-significant although with expected sign. Column (8) reports results for the more general model including all the interaction terms jointly. Interestingly, institutional variables are jointly insignificant for explaining the management quality gap of family firms, while cultural variables gain statistical significance. That *Freedom of choice* is statistically significant while *Family ties* is slightly not, it is also in line with our conjecture that the productivity of family specific human capital, and hence the management quality gap between family and non-family firms, is affected more by the interdependence and strength of cooperation among individuals belonging to the same social group rather than by the vertical transmission within the close family.

Figure 7 displays the marginal effects of *Family firm* for different levels of *Individualism* for the full model in column (8). The management quality gap decreases with the degree of individualism and becomes statistically not different from zero in individualistic societies. Also the economic magnitude of this heterogeneity is substantial: a one standard deviation increase in the degree of individualism (25.6) is associated with an average reduction of 0.077 points in the management quality gap between family

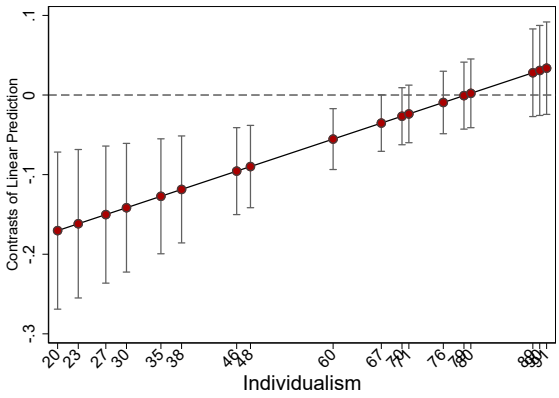
[19] Given that our main variable of interest varies at country level (i.e., *Individualism*), throughout we present estimates with robust standard errors clustered at country level. However, since the small number of clusters could bias the estimates, in unreported regressions available upon request, we checked that our results are robust to clustering at country×industry level, with 1598 or 392 clusters depending on whether we use either the three or two-digits sector classification, or yet clustering at industry level only (with 153 three digits clusters).

Table 1: Management Quality and Productivity of Family Specific Human Capital

	Management quality									
	OLS								IV (second stage)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family firm	-0.048*	-0.209***	-0.548**	-0.193***	-0.203***	-0.178***	-0.209***	-0.907***	-0.243***	-0.843***
	(0.023)	(0.056)	(0.217)	(0.062)	(0.055)	(0.054)	(0.056)	(0.233)	(0.064)	(0.269)
Family firm × Individualism		0.003***	0.002***	0.002***	0.002**	0.002**	0.003**	0.003***	0.003***	0.002***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family firm × Freedom of choice			0.051					0.092***		0.087**
			(0.030)					(0.032)		(0.034)
Family firm × Family ties (unimportance)				0.105				0.104		0.109
				(0.092)				(0.075)		(0.071)
Family firm × Institutional quality					0.013			0.039		0.033
					(0.010)			(0.030)		(0.032)
Family firm × Barrier to entry index						-0.010		0.039		0.031
						(0.009)		(0.026)		(0.032)
Family firm × Financial development							0.000	-0.000		-0.000
							(0.000)	(0.000)		(0.000)
Observations	8214	8214	8214	8214	8214	8214	8214	8214	8214	8214
Adjusted R^2	0.367	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.153	0.154
Hansen overidentification test (p-value)									0.413	0.544
Kleibergen-Paap F-statistic									36.145	82.720
Anderson-Rubin (p-value)									0.000	0.000

The dependent variable is the quality of management practices. OLS estimates in columns (1)-(8). Second stage results of the instrumental variable estimates in columns (9)-(10), where *Family firm* × *Individualism* is instrumented with *Genetic Diversity* from Ashraf and Galor (2013) and *No Pronoun Drop* from Tabellini (2008) interacted with *Family firm*. All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the percentage of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. See Table F.1 and Table F.7 in Appendix for, respectively, the full specification and the first stage estimates. The Stock-Yogo (2005) 10% critical value for the Kleibergen-Paap F-statistic is 19.93 in both columns (9) and (10). Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Figure 7: Individualism and the Marginal Effects of Family Firms on Managerial Quality



Note: Marginal effects refer to column (8) of Table 1.

and non-family firms, corresponding to a moderating effect of about 8.5% of the direct effect of *Family firm* ($100 \times (0.077/0.907)$). To put it differently, the overall differential in the management quality of family and non-family firms changes from -0.302 for the least individualistic country to -0.247 management quality points for the average individualistic one, implying a reduction in the management quality gap of 18.2%.[20]

We examine the robustness of these findings with several checks. First, in Tables F.9-F.12 in Appendix, we show that *Individualism* is robust to the inclusion of a wide range of country level variables as well as to different specifications.[21] Moreover, although *Individualism* pre-dates the firms' management quality, the latter can be a highly persistent feature of firms and a weak management quality of family firms can increase the value of the family specific human capital for doing business. Then, to address this potential reverse causality concern, we follow an IV approach similar to that suggested by Gorodnichenko and Roland (2017), instrumenting *Individualism* with the use of pronouns in the country's language from Tabellini (2008) and the genetic diversity of local population from Ashraf and Galor (2013). Language structures with strict rules governing the use of first and second pronouns are correlated to cultural traits emphasizing individualism. Hence, we expect the dummy variable *No Pronoun Drop*, equal to one if the rule forbidding first person pronoun drop is operative and zero otherwise, to be positively correlated with *Individualism*. Similarly, evidence suggests that

[20] This is calculated as follows. The average value of *Individualism* is 59.8, while the least individualistic countries (China and Singapore) have an *Individualism* value of 20. The average management quality is 2.937 in the overall estimation sample and 2.797 for the least individualistic countries. Then, the overall effect of *Family firm* on the management quality gap changes from $(20 \times 0.003 - 0.907)/2.797 = -0.302$ to $(59.8 \times 0.003 - 0.907)/2.937 = -0.247$ for the average individualistic country.

[21] In particular, we check the robustness to human capital, trust, ethnic and linguistic fractionalization, family structure, executive constraints, legal origins and the single components of *Institutional quality* and *Barrier to entry index*. By contrast, when we exclude *Individualism*, coefficients for *Freedom of choice*, *Family ties*, *Institutional quality* and *Barriers to entry* gain statistical significance, with the expected impact on the management quality gap (Table F.8 in Appendix).

genetic diversity has an adverse effect on social cohesion, and thus plausibly, a positive impact on the emergence of individualism (Ashraf and Galor, 2018). Columns (9) and (10) show that our findings are broadly robust and not subject to a weak or invalid instrument problem, as the Hansen overidentification test, the Kleibergen-Paap F-statistic and the Anderson-Rubin indicate (see Table F.7 in Appendix for the first stage estimates). Notwithstanding, provided that the choice of satisfactory instruments in a cross-country setting is always highly questionable, we are very careful not to give a causal interpretation to any of our results. Still, this strategy provides a useful robustness check to the effect of *Individualism*.

4.2.2 Family and professional managers Another specific prediction of our model is that the management quality gap between family and non-family firms is due to the group of family firms which keep the management leadership within the family, relying on the family specific human capital, while the family firms that hire professional managers are on average managed as well as the non-family ones (Proposition 12). To test this prediction, we split the dummy *Family firm* into two further dummies: *Family CEO* that takes the value 1 if the CEO at the helm of the family firm is a member of the family, and 0 otherwise; *External CEO*, that takes the value 1 if the family firm is run by a professional CEO external to the family, and 0 otherwise. Then, we estimate

$$\begin{aligned} Management\ quality_{isct} = {} & \beta_1\ Family\ CEO_{isct} + \eta_1\ Family\ CEO_{isct} \times Individualism_c + \\ & + \beta_2\ External\ CEO_{isct} + \eta_2\ External\ CEO_{isct} \times Individualism_c + \\ & + X_{isct}\Phi + \alpha_c + \alpha_c t + \lambda_t + \mu_s + \varepsilon_{isct}, \end{aligned} \tag{29}$$

where we expect β_1 and η_1 to be statistically significant and, respectively, negative and positive, while β_2 and η_2 not to be statistically different from zero.

Table 2 reports the regression results. In column (2) we consider a specification without any country level variables, while in column (3), we estimate the full specification including all the cultural and institutional controls of Table 1 interacted with the two dummies *Family CEO* and *External CEO*. Consistent with our theory, coefficients for *Family CEO* and its interaction with *Individualism* are significant and with the same signs as for the basic model. By contrast, *External CEO* and *External CEO* × *Individualism* are not significant, suggesting that family firms with professional managers are indistinguishable from non-family firms, regardless of the degree of collectivism of society and productivity of the family specific human capital.

Again, these results are robust to several checks. First, in columns (4) and (5) we implement the IV strategy, where the interactions between *Family CEO*, *External CEO* and *Individualism* are instrumented with our set of instruments interacted with *Family CEO* and *External CEO* (see Table F.7 in Appendix for the first stage estimates). Then, in Tables F.13-F.15 in Appendix, we report the robustness to different specifications as

Table 2: Management Quality and Family Specific Human Capital: Family and External CEOs

	Management quality				
	OLS			IV (second stage)	
	(1)	(2)	(3)	(4)	(5)
Family CEO	-0.073***	-0.241***	-1.032***	-0.261***	-0.956***
	(0.024)	(0.066)	(0.254)	(0.067)	(0.300)
External CEO	0.078**	0.026	-0.340	-0.064	-0.412
	(0.030)	(0.065)	(0.345)	(0.081)	(0.342)
Family CEO × Individualism		0.003***	0.003***	0.003***	0.003***
		(0.001)	(0.001)	(0.001)	(0.001)
External CEO × Individualism		0.001	0.001	0.002	0.001
		(0.001)	(0.001)	(0.001)	(0.001)
Full interactions	No	No	Yes	No	Yes
Observations	8214	8214	8214	8214	8214
Adjusted R^2	0.368	0.369	0.369	0.155	0.155
Hansen overidentification test (p-value)				0.691	0.191
Kleibergen-Paap F-statistic				14.726	11.583
Anderson-Rubin (p-value)				0.003	0.000

The dependent variable is the quality of management practices. OLS estimates in columns (1)-(3). Second stage results of the instrumental variable estimates in columns (4)-(5), where the interactions between *Family CEO*, *External CEO* and *Individualism* are instrumented with *Genetic Diversity* from Ashraf and Galor (2013) and *No Pronoun Drop* from Tabellini (2008) interacted with *Family CEO* and *External CEO*. All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm level controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the percentage of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Full interactions is the complete set of interactions of Family CEO and External CEO with the other country level controls as in Table 1. See Table F.2 and Table F.7 in Appendix for, respectively, the full specification and first stage estimates. The Stock-Yogo (2005) 10% critical value for the Kleibergen-Paap F-statistic, is 7.56 in both columns (4) and (5). Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

well as to the inclusion of different country variables.

4.2.3 Distribution of family firms quality The insurance nature of the family specific human capital originates two specific predictions about the distribution of management quality across family firms. First, higher managerial value of the family specific human capital increases the threshold abilities a^{ϕ} and a^{a}, thus increasing the share of badly managed family firms and decreasing the share of well managed ones. At the same time, the variability of the quality of management practices adopted by family firms decreases as the productivity of the family specific human capital increases.

To test these predictions, we follow a cross-country, cross-industry approach (Rajan and Zingales, 1998). We aggregate the WMS data at the country-industry level[22] and

[22]We aggregate the data at the US SIC 1987 2-digit classification (20 sectors). In our sample, the number of country-industry cells is 290, due to missing sectors in some countries and family firms in some country-industry cells. The missing cells are mainly concentrated in the least individualistic countries, China and

Table 3: Individualism and Management Quality of Family Firms

	Percentage of family firms whose management quality is:			
	Low	High	Low	High
	(1)	(2)	(3)	(4)
Individualism	-0.004***	0.003***	-0.003**	0.003**
	(0.001)	(0.001)	(0.002)	(0.001)
Country controls	No	No	Yes	Yes
Observations	290	290	290	290
Adjusted R^2	0.205	0.267	0.233	0.271

OLS estimates. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects, and the average firm size in the country-industry cell. Country controls in columns (3) and (4) are: *Freedom of choice*, *Family ties*, *Institutional quality*, *Barrier to entry index*, *Human capital*, *Financial development*, *Absolute latitude*. See Table F.3 in Appendix for full specification. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

build two new dependent variables, *Family firm quality*^{Low} and *Family firm quality*^{High}, as the percentages of family firms, respectively, below the 40th and above the 60th percentiles of the management quality distribution.[23] Then, we estimate

$$Family\ firm\ quality^{z}_{sc} = \beta\ Individualism_c + \delta\ Firm\ Size_{sc} + X_c\Gamma + \mu_s + \varepsilon_{sc}, \qquad (30)$$

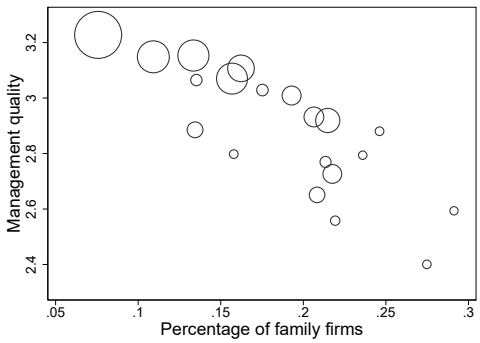
where we expect β to be negative when $z = Low$, and positive when $z = High$. As *Individualism* varies at country level, we do not include country fixed effects, while accounting for a large set of country variables X_c including *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index*, *Financial development*, *Human capital* and *Absolute latitude*. In addition, we account for the average firm size in the country-industry cell, and for industry fixed effects μ_s.

The regression results (Table 3) show that the coefficient for *Individualism* is statistically significant and negatively (positively) associated with the percentage of family firms of low (high) quality. These findings holds both in the specification without and with country level controls, as well as in other specifications in Appendix, where we check the robustness to an array of different country level controls and empirical spec-

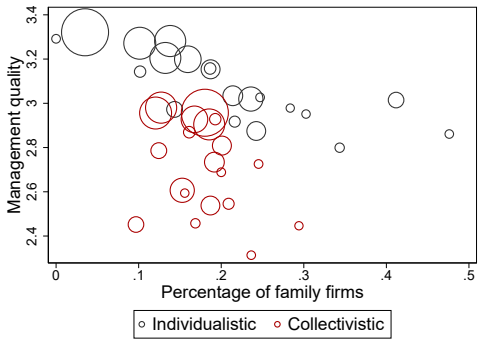
Singapore, and in three industrial sectors below the average level of R&D intensity, *Tobacco* (code 21), *Petroleum & Coal products* (code 29) and *Leather and leather products* (code 31).

[23] In this way, we assume that firms between the 40th and 60th percentiles of management quality distribution cannot be easily distinguished in badly and well managed ones. In Appendix, we show that results are robust to the adoption of 25th and 75th quality percentile thresholds (Tables F.18 and F.23) or even to the assumption that all firms can be classified as badly or well managed, using the median (Tables F.19 and F.24).

Figure 8: The Impact of Family Firms on Management quality and R&D intensity Across Sectors



(a) Percentage of family firms across sectors



(b) Percentage of family firms across sectors and individualistic/collectivistic societies

Note: Each observation indicates the industry sector averages of management quality and percentage of family firms. The size of the circles represents the R&D intensity of each industrial sector. Individualistic (collectivistic) are countries with individualism degree greater or equal to (lower than) its median.

ifications (Tables F.16-F.17) and to different measures of *Family firm quality*$^z_{sc}$ computed using either the 25th-75th or the 50th (median) quality percentile thresholds (Tables F.18-F.19). Consistent with our theory, in countries where the managerial value of the family specific human capital is higher the share of family firms of low quality is larger, while that of high quality is lower.

In line with an erosion-type argument, the managerial value of the family specific human capital can also vary at industry level, being lower in more dynamic and innovative industrial sectors. We measure the dynamism of industry s (*R&D intensity*) as the 2000-2005 average of the industry R&D expenditures over production in the United States (STAN, OECD).

The negative correlation between the industry average management quality and percentage of family firms has a clear gradient (Figure 8(a)), where industrial sectors with higher *R&D intensity* display higher management quality and lower share of family firms. A similar pattern emerges in Figure 8(b) where we distinguish between collectivistic and individualistic countries, defined as those with values of *Individualism* lower than and above the median. Moreover, the average management quality of collectivistic countries is lower than that of individualistic ones, and the cross-industry correlation between management quality and percentage of family firms is stronger.

Therefore, we proxy the productivity of the family specific human capital in the country-industry by the interaction between *Individualism* and *R&D intensity*:

$$\begin{aligned} Family\ firm\ quality^z_{sc} = \beta\ Individualism_c \times R\&D\ intensity_s + X_{sc}\,\Gamma + \\ + \delta\ Firm\ Size_{sc} + \alpha_c + \mu_s + \varepsilon_{sc}. \end{aligned} \tag{31}$$

Table 4: Determinants of Management Quality of Family Firms, country-industry analysis

	Percentage of family firms whose management quality is:				Std. Dev.	
	Low	High	Low	High	Management	
	(1)	(2)	(3)	(4)	(5)	(6)
Individualism × R&D intensity	-0.001***	0.001***	-0.001***	0.001***	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country × Industry controls	No	No	Yes	Yes	No	Yes
Observations	290	290	290	290	240	240
Adjusted R^2	0.312	0.348	0.303	0.341	0.061	0.041

OLS estimates. The dependent variables in columns (1)-(4) are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The dependent variable in columns (5)-(6) is the standard deviation of the management quality of family firms by country-industry. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry fixed effects, and the average firm size in the country-industry cell. Country×Industry controls are: *Human capital*×*Skill intensity*, *Capital endowment*×*Capital intensity*, *Financial development*×*External dependence*, *Institutional quality*×*Contract intensity*, *Barrier to entry*×*Intangible intensity*. See Table F.4 in Appendix for full specification. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Coefficient β now identifies the cross-country, cross-industry effect of differences in country individualism and industry dynamism on the distribution of family firms quality. Besides industry fixed effects, we include country fixed effects to account for unobservables at country level. In addition, we add a set X_{sc} of country-industry variables accounting for country factor endowment and industry factor intensity (*Human capital*$_c$×*Skill intensity*$_s$; *Physical capital*$_c$×*Capital intensity*$_s$), country financial development and industry dependence from external finance (*Financial development*$_c$×*External dependence*$_s$), country institutional quality and industry intensity in institutional quality (*Institutional quality*$_c$×*Contract intensity*$_s$; *Barriers to entry*$_c$×*Intangible intensity*$_s$).

Columns (1) through (4) of Table 4 show that the effect of *Individualism* on the shares of badly and well managed family firms is stronger in more innovative sectors, where we expect the managerial value of the family specific human capital to be lower. These effects are statistically significant across a variety of specifications[24] and quantitatively relevant. Considering a country at the 25th percentile of the *Individualism* distribution (in our sample Greece), a one standard deviation increase in the degree of individualism generates an increase in the difference between the shares of high-quality family firms in the industries at the 75th ("Industrial machinery & equipment") and at the 25th percentiles of the *R&D intensity* distribution ("Apparel & other textiles") from 0.25 to 0.45. Concurrently, the difference between the shares of badly managed family firms decreases from 0.5 to 0.3.

Finally, consistent with Proposition 5 according to which the variability of management quality across family firms is larger when the managerial value of the family

[24]In Appendix, we show the robustness of these results to different empirical specifications (Table F.20), to several country×industry and country×*R&D intensity* controls (Tables F.21-F.22) as well as to different measures of *Family firm quality*$^z_{sc}$ computed using either the 25th-75th or the 50th (median) quality percentile thresholds (Tables F.23-F.24).

Table 5: Management Quality and Family Specific Human Capital by Industrialization Stage

	Management quality				
	(1)	(2)	(3)	(4)	(5)
Family firm	-0.047*	-0.208***	-0.031	-0.187***	-0.191***
	(0.024)	(0.056)	(0.027)	(0.064)	(0.065)
Family firm × Individualism		0.003***		0.002***	0.003***
		(0.001)		(0.001)	(0.001)
Family firm × Not industrialized			-0.096***	-0.049	0.155
			(0.031)	(0.033)	(0.096)
Family firm × Not industrialized × Individualism					-0.005**
					(0.002)
Observations	7950	7950	7950	7950	7950
Adjusted R^2	0.367	0.368	0.367	0.368	0.368

OLS estimates. The dependent variable is the quality of management practices. Not industrialized is a dummy equal to one if the country was not industrialized by year 2005 and zero otherwise, according to the *YIT* measure (Bentzen et al., 2013). Data on the timing of industrialization for Singapore are missing. All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm level controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the percentage of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism* and *Not industrialized*) are captured by the country fixed effects. See Table F.5 in Appendix for full specification. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

specific human capital is lower, columns (5) and (6) show that the standard deviation of the family firms' management quality correlates positively with *Individualism* × *R&D intensity*.

4.2.4 Family firms in the industrialization process Consistent with theory (Proposition 8), we provide evidence on the role of family firms in the industrialization process. First, the *Year of industrial transition (YIT)*, computed by Bentzen et al. (2013) as the year in which employment in industry exceeds employment in agriculture, and used as a proxy for the timing of the industrial/managerial take-off, correlates negatively with *Individualism*. This suggests that societies that attach great economic value to family specific human capital industrialize later.

Thus, we examine (i) whether the management quality of family firms is lower in late- than in early-industrialized countries, and (ii) whether in the former countries, unlike in countries with mature industrialization, the managerial value of the family specific human capital improves the average management quality of family firms. To this end, we augment model in (28) including the triple obtained interacting *Family firm* × *Individualism* with the dummy *Not industrialized*, assuming the value 1 if a country is not yet industrialized by year 2005 and zero otherwise, according to the *YIT* measure.[25]

Table 5 presents the regression results. Columns (1) and (2) reproduce the basic

[25]We choose the 2005 as the year closest to the time span of the WMS. According to the *YIT* measure (Bentzen et al., 2013), indeed, the first available years of *Industrial transition* before the 2005 are the 1986 and the 1987, while in our estimation sample firms are all interviewed between 2006 and 2012.

Table 6: Determinants of Management Quality of Family Firms by Industrialization Stage

	Percentage of family firms whose management quality is:							
	Low	High	Low	High	Low	High	Low	High
	Not industrialized		Industrialized		Not industrialized		Industrialized	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individualism × R&D intensity	-0.001	0.002	-0.001***	0.001***	-0.009	0.004	-0.001***	0.001***
	(0.004)	(0.002)	(0.000)	(0.000)	(0.008)	(0.003)	(0.000)	(0.000)
Country × Industry controls	No	No	No	No	Yes	Yes	Yes	Yes
Observations	35	35	249	249	35	35	249	249
Adjusted R^2	0.118	0.257	0.296	0.331	0.050	0.185	0.284	0.321

OLS estimates. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management score distribution. The units of analysis are country-industry observations for 20 countries and 20 industries (2-digit US SIC). Not industrialized and industrialized indicate countries not yet and already industrialized by 2005. Data on the timing of industrialization for Singapore are missing. All regressions include country and industry fixed effects, and the average firm size in the country-industry cell. Country×Industry controls are: *Human capital*×*Skill intensity*, *Capital endowment*×*Capital intensity*, *Financial development*×*External dependence*, *Institutional quality*×*Contract intensity*, *Barrier to entry*×*Intangible intensity*. See Table F.6 in Appendix for full specification. Robust standard errors in parentheses are clustered at country×industry sector; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

results of model (28), excluding Singapore, for which the year of industrialization is missing. In columns (3) through (5), we distinguish between countries already and not yet industrialized in 2005. Consistent with our theoretical predictions, column (3) shows that the quality of management practices of family firms in late-industrialized countries is lower than that of family firms in countries with mature industrialization. In column (4), we include the interaction between *Family firm* × *Individualism*, and the coefficient for the interaction *Family firm* × *Not industrialized* loses magnitude and significance, suggesting that the association between industrialization and management quality of family firms passes through the productivity of the family specific human capital rather than the industrialization condition per se. In column (5), the negative coefficient for the triple interaction term indicates that in countries which are not yet industrialized family firms display a higher management quality as more collectivistic-oriented is the local culture. This is consistent with the idea that in the early stage of development, when the managerial take-off has not yet taken place, the productivity of the family specific human capital sustains the management capacity of firms.

The last piece of evidence we provide is in the spirit of a placebo exercise. According to our theory, in the pre-industrialization stage, when the economy is stagnant, the industry is populated only by family firms managed by exploiting the family specific human capital. In this stage, the productivity of the family specific human capital has no effect on the distribution of management quality across family firms.

Then, in Table 6, we split our sample between countries not yet and already industrialized by year 2005. Reassuringly, our results show that in countries which are not yet industrialized *Individualism* × *R&D intensity* has no statistical power to explain the distribution of management quality across family firms, while in countries already

industrialized it significantly affects the share of badly and well managed family firms.

To mitigate the potential concern that these results could be driven by the unbalanced nature of the samples of industrialized and not industrialized countries and by the scant number of observations among the not industrialized sample, in Table F.25 in Appendix we show that even when we use other benchmark years for distinguishing the industrialized and not industrialized countries results remain broadly unchanged.

5 Conclusions

Our paper fills a gap in the historical and economic literature, providing a unified framework that explains both the dual role of family firms in economic development and their evolution in terms of managerial capital.

The key ingredient of our theory explaining succession in family firms, occupational choices, the management quality of (family and non-family) firms is the privileged access of entrepreneurs' heirs to an intangible, rent-seeking asset, which contributes to the managerial capital of family firms, without contributing to increase the aggregate technology and economy's growth rate. Although conceivably beneficial for all entrepreneurs' heirs in any possible occupation, access to family specific human capital is assumed to be especially valuable to prop up the managerial productivity and income of the least talented descendants, who find it more rewardable to continue the family business rather than supply their low abilities to the labor market. The insurance nature of the family specific human capital and its productivity depend on the socio-cultural context of the society in which firms operate. The interaction between the endogenous quality of managerial capital of family firms and the advancement of technology explains the diverse role of family firms in the development process and their evolution during industrialization.

We present a number of robust correlations consistent with our theory. We find that the degree of collectivism of societies, which is positively correlated with the productivity of the family specific human capital, influences the management quality gap between family and non-family firms and the distribution of management quality across family firms. In particular, we show that the share of badly (well) managed family firms is higher (lower) in societies which assign high value to family specific human capital, especially in less dynamic and innovative industrial sectors. We also show that countries with collectivistic-oriented values industrialize later and that in late-industrialized countries the quality of family firms' management is lower than in countries with mature industrialization. However, as our theory predicts, in the early stage of development, collectivistic values support the management quality of family firms, while they do not have significant effects on the distribution of management quality across family firms.

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Supplementary Material for

"The Rise and Fall of Family Firms in the Process of Development"

Maria Rosaria Carillo* Vincenzo Lombardo† Alberto Zazzaro‡

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*University of Naples Parthenope, carillo@uniparthenope.it.
†Corresponding author, University of Naples Parthenope, vincenzo.lombardo@uniparthenope.it.
‡University of Naples Federico II, CSEF and MoFiR, alberto.zazzaro@unina.it.

Appendix A. Proofs of the main model

Proof of Proposition 1

Using (10)-(11) and (14)-(15) it follows that: (a) $w_{t+1} < \hat{w} \implies a^{\phi}_{t+1} > a^{a}_{t+1}$, which implies that $I^{i,e}_{\phi,t+1} > \max\left\{I^{i,e}_{\omega,t+1}, I^{i,e}_{a,t+1}\right\}$ for $a^{i}_{t+1} < \bar{a}_{t+1}$, while $I^{i,e}_{a,t+1} \geq \max\left\{I^{i,e}_{\omega,t+1}, I^{i,e}_{\phi,t+1}\right\}$ for $a^{i}_{t+1} \geq \bar{a}_{t+1}$; (b) $w_{t+1} \in [\hat{w}, \tilde{w}] \implies a^{\phi}_{t+1} < a^{a}_{t+1} < 1$, which implies that $I^{i,e}_{\phi,t+1} \geq \max\{I^{i,e}_{\omega,t+1}, I^{i,e}_{a,t+1}\}$ for $a^{i}_{t+1} \leq a^{\phi}_{t+1}$, $I^{i,e}_{a,t+1} \geq \max\{I^{i,e}_{\omega,t+1}, I^{i,e}_{\phi,t+1}\}$ for $a^{i}_{t+1} \geq a^{a}_{t+1}$, while $I^{i,e}_{\omega,t+1} > \max\{I^{i,e}_{\phi,t+1}, I^{i,e}_{a,t+1}\}$ for $a^{i}_{t+1} \in (a^{\phi}_{t+1}, a^{a}_{t+1})$; (c) $w_{t+1} > \tilde{w} \implies a^{\phi}_{t+1} < 1 < a^{a}_{t+1}$, which implies that $I^{i,e}_{\phi,t+1} \gtreqless I^{i,e}_{\omega,t+1}$ for $a^{i}_{t+1} \lesseqgtr a^{\phi}_{t+1}$.

Proof of Proposition 2

Using (16) and (17), it follows that: (a) $w_{t+1} \leq \tilde{w} \implies a^{a}_{t+1} \leq 1$, which implies that $I^{i,\omega}_{e,t+1} \gtreqless I^{i,\omega}_{\omega,t+1}$ for $a^{i}_{t+1} \gtreqless a^{a}_{t+1}$; (b) $w_{t+1} > \tilde{w} \implies a^{a}_{t+1} > 1$, which implies that $I^{i,\omega}_{e,t+1} < I^{i,\omega}_{\omega,t+1}$ for $a^{i}_{t+1} \in [0,1]$.

Proof of Lemma 1

Substituting in eq. (12) a^{a}_{t+1} for $1 - g_{t+1}$ from eq. (19) and $(a^{a}_{t+1})^{1-\alpha}$ for $w_{t+1}/\theta A_{t+1}$ from eq. (13), it follows that for any $a^{a}_{t+1} < 1$, $a^{\phi}_{t+1} = \phi^{1/\alpha}\, a^{a}_{t+1} \Leftrightarrow a^{\phi}_{t+1} < a^{a}_{t+1}$. Hence, there can be no equilibrium wage rate, ensuring $a^{\phi}_{t+1} = a^{a}_{t+1}$ such that for any equilibrium wage rate $w_{t+1} > \hat{w}$ holds.

Proof of Proposition 3

Using eq. (19) in (20) and (21) and solving the integrals, the aggregate human capital supply and demand are given by:

$$H^{S}_{t+1} = \frac{1}{2}\begin{cases} (a^{a}_{t+1})^2 - n_t (a^{\phi}_{t+1})^2 & \text{if} \quad w_{t+1} < \tilde{w} \\ 1 - n_t (a^{\phi}_{t+1})^2 & \text{if} \quad w_{t+1} \geq \tilde{w}, \end{cases} \tag{A.1}$$

and

$$H^{D}_{t+1} = \left[\frac{(1-\alpha)\, A_{t+1}}{w_{t+1}}\right]\begin{cases} n_t\, a^{\phi}_{t+1}\, (\phi\, a^{a}_{t+1})^{1/\alpha} + \dfrac{\alpha}{1+\alpha}\left[1 - (a^{a}_{t+1})^{(1+\alpha)/\alpha}\right] & \text{if} \quad w_{t+1} < \tilde{w} \\ n_t\, a^{\phi}_{t+1}\, \phi^{1/\alpha} & \text{if} \quad w_{t+1} \geq \tilde{w}. \end{cases} \tag{A.2}$$

Using (12) and (13) in (A.1) and (A.2), the equilibrium wage schedule is:

$$w_{t+1} = \theta A_{t+1}\begin{cases} \left[\dfrac{2\,\alpha\,(1-\alpha)}{\alpha\,(3-\alpha) - (1+\alpha)\,(2-\alpha) n_t \phi^{\frac{2}{\alpha}}}\right]^{\frac{\alpha(1-\alpha)}{(1+\alpha)}} & \text{if} \quad n_t < \tilde{n} \\ \phi\, n_t^{\frac{\alpha}{2}} \left(\dfrac{2-\alpha}{\alpha}\right)^{\alpha/2} & \text{if} \quad n_t \geq \tilde{n}, \end{cases} \tag{A.3}$$

where $\tilde{n} \equiv n_t : w_{t+1} = \tilde{w}$ is the number of firms such that the equilibrium wage rate is equal to $\tilde{w}$

$$\tilde{n} = \frac{\alpha}{(2-\alpha)\,\phi^{2/\alpha}}. \tag{A.4}$$

Proof of Proposition 4

From Propositions 1 and 2, the dynamic system governing the evolution of the industrial sector is

$$n_{t+1} = \begin{cases} n_t\, a^{\phi}_{t+1} + 1 - a^{a}_{t+1} & \text{if} \quad n_t < \tilde{n} \\ n_t\, a^{\phi}_{t+1} & \text{if} \quad n_t \geq \tilde{n}. \end{cases} \tag{A.5}$$

The system in (A.5) admits a unique stable steady state $n^* < \tilde{n}$, with $n^* : n_1(n^*) = n^*$; at the steady state the corresponding growth rate is then $g^* = 1 - a^a(n^*) = g(n^*) > 0$. To see this, using (12) and (13) and the equilibrium wage in (A.3), rewrite explicitly the system in (A.5) as:

$$n_{t+1} = \begin{cases} 1 - \left(1 - \phi^{1/\alpha} n_t\right) a^a(n_t) \equiv n_1(n_t) & \text{if} \quad n_t < \tilde{n} \\ \left(\dfrac{\alpha\, n_t}{2-\alpha}\right)^{\frac{1}{2}} \equiv n_2(n_t) & \text{if} \quad n_t \geq \tilde{n}. \end{cases} \tag{A.6}$$

with

$$a^a(n_t) = \left[\frac{2\,\alpha\,(1-\alpha)}{\alpha(3-\alpha) - (1+\alpha)(2-\alpha)\,\phi^{2/\alpha} n_t}\right]^{\frac{\alpha}{1+\alpha}}. \tag{A.7}$$

First, from (A.6) and (A.7), note that for any $n_t < \tilde{n}$, $n_1(0) = 1 - [2(1-\alpha)/(3-\alpha)]^{\alpha/1+\alpha} \in [0,1]$, $n_1(\tilde{n}) = n_2(\tilde{n}) < \tilde{n}$ and $n_1(n_t)$ is monotonically increasing with a slope less than one; formally, $\partial n_1(n_t)/\partial n_t > 0$ and $|\partial n_1(n_t)/\partial n_t| < 1$. Hence, $n_1(n_t)$ must intersect the 45° degree line from above only once, with a slope less than one. Moreover, for any $n_t \geq \tilde{n}$, $n_2(n_t)$ is increasing and concave, $\partial n_2/\partial n_t > 0$ and $\partial^2 n_2/\partial n_t^2 < 0$, with $n_2(1) < 1$. Hence, $n_2(n_t)$ cannot intersect the 45° degree line such that there cannot exist any admissible steady state for $n_t \geq \tilde{n}$.

From above, the unique steady state n^* of the dynamic system in (A.5) must satisfy the equation $n_1(n^*) = n^*$ in $[0, \tilde{n}]$. Formally, it must derive as the solution of the following implicit equation:

$$n^* = \frac{1 - a^a(n^*)}{1 - a^{\phi}(n^*)} \equiv f(n^*). \tag{A.8}$$

Using (A.7) and Lemma 1, ensuring that $a^{\phi}(n_t) = \phi^{1/\alpha} a^a(n_t)$ for any $n_t < \tilde{n}$, $f(0) > 0$ and $f(\tilde{n}) = 0$. Further, from (A.8), it derives that:

$$\frac{\partial f(n^*)}{\partial n^*} = -\frac{\left(1 - \phi^{\frac{1}{\alpha}}\right)}{\left(1 - \phi^{\frac{1}{\alpha}}\, a^a(n^*)\right)^2} \frac{\partial a^a(n^*)}{\partial n^*} < 0 \tag{A.9}$$

since

$$\frac{\partial a^a(n_t)}{\partial n_t} = \frac{a^a(n_t)\,\alpha\,(2-\alpha)\,\phi^{\frac{2}{\alpha}}}{\alpha\,(3-\alpha) - (1+\alpha)\,(2-\alpha)\,\phi^{\frac{2}{\alpha}}\, n_t} > 0 \tag{A.10}$$

immediately follows from eq. (A.7). Thus, there exists a unique fixed point n^* of the function $f(n^*)$ and hence a unique solution for the equation $n_1(n^*) = n^*$.

The unique steady state is also globally stable since, as shown above, $n_1(n_t)$ intersects the 45° de-

gree line from above, with a slope less than one. At the steady state n^*, the distribution of the individuals' abilities is stationary since the thresholds $a^a(n_t)$ and $a^\phi(n_t)$ are independent of A_{t+1}, despite the constant positive growth rate of the technology. Using eq. (A.7), $\partial a^a(n_t)/\partial A_{t+1} = \partial a^\phi(n_t)/\partial A_{t+1} = 0$.

Proof of Proposition 5

Thresholds and growth Substituting n^* from (A.8) for n_t in (A.7) and rearranging using $a^\phi = \phi^{\frac{1}{\alpha}} a^a$ from Lemma 1, $a^a(n^*)$ can be written as the solution to the implicit equation:

$$F(a^a) = a^a - z(a^a;\phi) = a^a - \left[\frac{2\,\alpha\,(1-\alpha)\,\left(1-\phi^{1/\alpha}a^a\right)}{\alpha(3-\alpha)\,\left(1-\phi^{1/\alpha}a^a\right) - (1+\alpha)(2-\alpha)\,\phi^{2/\alpha}(1-a^a)}\right]^{\frac{\alpha}{1+\alpha}} = 0. \quad \text{(A.11)}$$

Then,

$$\frac{\mathrm{d}\,a^a(n^*)}{\mathrm{d}\,\phi} = -\frac{\partial\,F(a^a)/\partial\,\phi}{\partial\,F(a^a)/\partial\,a^a} > 0, \quad \text{(A.12)}$$

since

$$\frac{\partial\,F(a^a)}{\partial\,a^a} = 1 + z(a^a;\phi)\left[\frac{\alpha(2-\alpha)\phi^{2/\alpha}\,(1-\phi^{1/\alpha})}{(1-\phi^{1/\alpha}\,a^a)\,(\alpha(3-\alpha)\,(1-\phi^{1/\alpha}a^a) - (1+\alpha)(2-\alpha)\,\phi^{2/\alpha}(1-a^a))}\right] > 0, \quad \text{(A.13)}$$

and

$$\frac{\partial\,F(a^a)}{\partial\,\phi} = -z(a^a;\phi)\left[\frac{(2-\alpha)\phi^{2/\alpha}\,(1-a^a)\,(2-\phi^{1/\alpha}a^a)}{\phi(1-\phi^{1/\alpha}\,a^a)\,(\alpha(3-\alpha)\,(1-\phi^{1/\alpha}a^a) - (1+\alpha)(2-\alpha)\,\phi^{2/\alpha}(1-a^a))}\right] < 0. \quad \text{(A.14)}$$

From (A.12), it immediately follows that the growth rate $g(n^*) = 1 - a^a(n^*)$ is decreasing in ϕ. Finally, Lemma 1 also implies that

$$\frac{\mathrm{d}\,a^\phi(n^*)}{\mathrm{d}\,\phi} = \phi^{\frac{1}{\alpha}}\left(\frac{a^a}{\alpha\,\phi} + \frac{\mathrm{d}\,a^a(n^*)}{\mathrm{d}\,\phi}\right) > 0.$$

Share of family and non-family firms From the above results, it immediately follows that the share of family firms $\nu_{f,\phi} = a^\phi(n^*)$ is increasing in ϕ, while the share of family firms $\nu_{f,a} = 1 - a^a(n^*)$ is decreasing in ϕ. Further, the overall share of family firms in the economy $\nu_f = a^\phi(n^*) + 1 - a^a(n^*)$ is increasing in ϕ

$$\frac{\partial\,\nu_f}{\partial\,\phi} = -\frac{\partial\,(a^a - a^\phi)}{\partial\,\phi} > 0, \quad \text{(A.15)}$$

since, after using $a^\phi = \phi^{\frac{1}{\alpha}}\,a^a$,

$$\frac{\partial\,(a^a - a^\phi)}{\partial\,\phi} = \frac{\partial\,a^a(1-\phi^{\frac{1}{\alpha}})}{\partial\,\phi} = (1-\phi^{\frac{1}{\alpha}})\frac{\mathrm{d}a^a}{\mathrm{d}\phi} - \frac{a^a\phi^{\frac{1}{\alpha}-1}}{\alpha} < 0. \quad \text{(A.16)}$$

To see this, observe that using (A.12)-(A.13)-(A.14) and rearranging, (A.16) is always verified since, for any $\phi \in [0,1]$, the following holds:

$$\alpha\,(2-\alpha)\,\phi^{\frac{1}{\alpha}}\,(1-\phi^{\frac{1}{\alpha}})\left[(1-a^a)\,\left(2-a^a\phi^{\frac{1}{\alpha}}\right)-a^a\phi^{\frac{1}{\alpha}}\right]< \\ \left(1-a^a\,\phi^{\frac{1}{\alpha}}\right)\,\left[\alpha\,(3-\alpha)\,\left(1-a^a\,\phi^{\frac{1}{\alpha}}\right)-(1+\alpha)\,(2-\alpha)\,(1-a^a)\,\phi^{\frac{2}{\alpha}}\right].$$

The result in (A.16) also implies that the entry rate, defined as the share of new, non-family, firms founded by worker' descendants, $\nu_{nf} = \dfrac{(1-n^*)\,(1-a^a(n^*))}{n^*}$, is decreasing in ϕ. To see this, note that in steady state the entry of new firms is equal to the exit of firms' heirs. Formally:

$$n^*\,\left(a^a(n^*)-a^\phi(n^*)\right)=(1-n^*)\,\left(1-a^a(n^*)\right).$$

Hence, it also verified that

$$a^a(n^*)-a^\phi(n^*)=\frac{(1-n^*)\,\left(1-a^a(n^*)\right)}{n^*}.$$

Since the left hand-side is decreasing in ϕ (A.16), so must the right-hand side.

Social Mobility Define the overall social mobility as the total exit E from the firm sector (i.e., equal to total entry for the equilibrium condition). Formally, $E = n^*\,(a^a(n^*)-a^\phi(n^*))$. Then,

$$\frac{\partial\,E}{\partial\,\phi}=a^a(n^*)(1-\phi^{\frac{1}{\alpha}})\,\left(\frac{\partial\,n^*}{\partial\,\phi}\right)+n^*\,\left(\frac{\partial\,a^a(n^*)(1-\phi^{\frac{1}{\alpha}})}{\partial\,\phi}\right). \tag{A.17}$$

Using (A.8) and (A.16) and rearranging,

$$\frac{\partial\,E}{\partial\,\phi}=\left(\frac{\mathrm{d}\,a^a(n^*)}{\mathrm{d}\,\phi}\right)\,\frac{\left(1-\phi^{\frac{1}{\alpha}}\right)\,\left(1-2\,a^a+\phi^{\frac{1}{\alpha}}a^{a^2}\right)}{\left(1-a^a\phi^{\frac{1}{\alpha}}\right)^2}-\frac{\phi^{\frac{1}{\alpha}}\,a^a\,(1-a^a)^2}{\alpha\phi\,\left(1-a^a\phi^{\frac{1}{\alpha}}\right)^2}<0. \tag{A.18}$$

To see this, note that using (A.12)-(A.13)-(A.14) and rearranging, (A.18) is always verified since, for any $\phi \in [0,1]$, the following holds:

$$\alpha\,(2-\alpha)\,\phi^{\frac{1}{\alpha}}\,(1-\phi^{\frac{1}{\alpha}})\left[\left(1-2\,a^a+a^{a^2}\phi^{\frac{1}{\alpha}}\right)\,\left(2-a^a\phi^{\frac{1}{\alpha}}\right)-a^a(1-a^a)\phi^{\frac{1}{\alpha}}\right]< \\ (1-a^a)\,\left(1-a^a\,\phi^{\frac{1}{\alpha}}\right)\,\left[\alpha\,(3-\alpha)\,\left(1-a^a\,\phi^{\frac{1}{\alpha}}\right)-(1+\alpha)\,(2-\alpha)\,(1-a^a)\,\phi^{\frac{2}{\alpha}}\right].$$

Variance Recalling that management quality is constant and independent of individual abilities for all family firms managed by heirs with ability $a^i \leq a^\phi$, while it is distributed uniformly for all the family firms managed by heirs with ability $a^i \geq a^a$, from the result in (A.12) it immediately follows that the variance of the management practices quality of family firms is decreasing in ϕ.

Proof of Proposition 6

From the definition of growth rate, eq. (A.7) implies that for any $n_t < \tilde{n}$

$$g_{t+1}=1-a^a(n_t)=g(n_t), \tag{A.19}$$

with $\partial g_{t+1}/\partial n_t < 0$ deriving from (A.10).

Substituting in $n_{t+1} = n_1(n_t)$ of the system (A.6) $1 - g_{t+1}$ for a^a_{t+1} and $g^{-1}(g_{t+1})$ for n_t from (A.19), we can rewrite

$$n_{t+1} = 1 - a^a_{t+1}\left(1 - n_t\phi^{\frac{1}{\alpha}}\right) = g_{t+1} + \left(\frac{\chi\left(1-g_{t+1}\right)^{\frac{(1+\alpha)}{\alpha}} - \alpha}{(1+\chi)\phi^{\frac{1}{\alpha}}(1-g_{t+1})^{\frac{1}{\alpha}}}\right) = \psi(g_{t+1}), \tag{A.20}$$

where $\chi \equiv \alpha\left(3-\alpha\right)/2\left(1-\alpha\right)$. Eq. (A.20) also implies that for each period t, $n_t = \psi(g_t)$, with $\tilde{n} \equiv n : \forall\, t,\, n_t = \psi(0)$

$$\tilde{n} = \frac{\alpha}{(2-\alpha)\phi^{1/\alpha}}, \tag{A.21}$$

and $\tilde{n} < \bar{n}$ follows immediately using (A.4). Moreover,

$$\frac{\partial n_t}{\partial g_t} = \frac{\partial \psi(g_t)}{\partial g_t} = 1 - \frac{\left(1-g_t\right)^{\frac{(1+\alpha)}{\alpha}}\left(1+\alpha-\chi\right)+\alpha}{\alpha\left(1+\chi\right)\phi^{\frac{1}{\alpha}}\left(1-g_t\right)^{\frac{(1+\alpha)}{\alpha}}} < 0, \tag{A.22}$$

is verified for any $g_t > 0$.

Using (A.7) and substituting back $\psi(g_t)$ for n_t in eq. (A.19), we finally have

$$g_{t+1} = v(g_t) = 1 - \left\{\frac{\alpha(1-g_t)^{\frac{1}{\alpha}}}{(1-g_t)^{\frac{1}{\alpha}}\left[\chi - (1+\chi)\,\phi^{\frac{2}{\alpha}}\,g_t - \chi\phi^{\frac{1}{\alpha}}(1-g_t)\right] + \alpha\phi^{\frac{1}{\alpha}}}\right\}^{\frac{\alpha}{(1+\alpha)}}, \tag{A.23}$$

with $v(0) = 1 - \left[\alpha/\left(\chi\left(1-\phi^{\frac{1}{\alpha}}\right) + \alpha\,\phi^{\frac{1}{\alpha}}\right)\right]^{\frac{\alpha}{(1+\alpha)}} \in (0,1)$, $\partial g_{t+1}/\partial g_t > 0$, $|\partial g_{t+1}/\partial g_t| < 1$ and $v(g^{max}) < g^{max}$, where g^{max} is the maximum value that the growth rate can assume consistently with a non-negative number of firms n_t; formally, $g^{max} \equiv g_t : \psi(g^{max}) = 0$, $g^{max} = \psi^{-1}(0)$.

Proof of Proposition 7

For each period $t+1$ and any $n_t \in [0, \tilde{n}]$,

1. The share of family firms is given by:

$$\nu^f_{t+1} = \frac{n_t\left(a^{\phi}_{t+1} + 1 - a^a_{t+1}\right)}{n_{t+1}},$$

and it is increasing in n_t,

$$\frac{\partial \nu^f_{t+1}}{\partial n_t} = \frac{\left(\partial a^a_{t+1}/\partial n_t\right)\phi^{\frac{1}{\alpha}}(1-n_t) + (1-a^a_{t+1})(1-a^a_{t+1}(1-\phi^{\frac{1}{\alpha}}))}{n^2_{t+1}} > 0, \tag{A.24}$$

since $\partial a^a_{t+1}/\partial n_t > 0$ from (A.10) above.

2. The share of family firms using family specific human capital is given by:

$$\nu^{f,\phi}_{t+1} = \frac{n_t a^{\phi}_{t+1}}{n_{t+1}},$$

and it is increasing in n_t. Formally:

$$\frac{\partial \nu_{t+1}^{f,\phi}}{\partial n_t} = \phi^{\frac{1}{\alpha}} \frac{\left(\partial a_{t+1}^a / \partial n_t\right) n_t + a_{t+1}^a (1 - a_{t+1}^a)}{n_{t+1}^2} > 0. \tag{A.25}$$

3. The share of family and non-family firms managed by employing entrepreneurial human capital is given by:

$$\nu_{t+1}^a = \frac{1 - a_{t+1}^a}{n_{t+1}},$$

and it is decreasing in n_t. Formally:

$$\frac{\partial \nu_{t+1}^a}{\partial n_t} = -\frac{\partial \nu_{t+1}^{f,\phi}}{\partial n_t} = -\phi^{\frac{1}{\alpha}} \frac{\left(\partial a_{t+1}^a / \partial n_t\right) n_t + a_{t+1}^a (1 - a_{t+1}^a)}{n_{t+1}^2} < 0. \tag{A.26}$$

4. The entry rate is given by:

$$\nu_{t+1}^{nf} = \frac{(1 - n_t)\left(1 - a_{t+1}^a\right)}{n_{t+1}},$$

and it is decreasing in n_t. Formally:

$$\frac{\partial \nu_{t+1}^{nf}}{\partial n_t} = -\frac{\left(\partial a_{t+1}^a / \partial n_t\right)(1 - n_t) n_t \phi^{\frac{1}{\alpha}} + (1 - a_{t+1}^a)(1 - a_{t+1}^a (1 - \phi^{\frac{1}{\alpha}}))}{n_{t+1}^2} < 0, \tag{A.27}$$

where, throughout, we use $a_{t+1}^{\phi} = \phi^{1/\alpha} a_{t+1}^a$ and rewrite $n_{t+1} = 1 - a_{t+1}^a (1 - n_t \phi^{1/\alpha})$.

5. Recalling that management quality is constant and independent of individual abilities for all family firms managed by heirs with ability $a_{t+1}^i \leq a_{t+1}^{\phi}$, while it is distributed uniformly for all family firms managed by heirs with ability $a_{t+1}^i \geq a_{t+1}^a$, from (A.10) it immediately follows that the variance of the management practices quality of family firms is a positive function of n_t and hence a negative function of g_t.

Finally, for any $n_t > \tilde{n}$, $a_{t+1}^a \geq 1$ and the total number of firms in the economy is $n_{t+1} = n_t a_{t+1}^{\phi}$. Hence, $\nu_{t+1}^f = \nu_{t+1}^{f,\phi} = 1$ and $\nu_{t+1}^a = \nu_{t+1}^{nf} = 0$.

Proof of Proposition 8

(a) For any $n_t \geq \tilde{n}$ the aggregate income per capita is given by:

$$Y_{t+1} = n_t \int_0^{a_{t+1}^{\phi}} y_{t+1}^i \, da_{t+1}^i = \Sigma n_t a_{t+1}^{\phi} \phi_{t+1}^{\frac{1}{\alpha}}, \tag{A.28}$$

where $\Sigma \equiv \left[(1 - \alpha)^{1-\alpha} A_{t+1} w_{t+1}^{-(1-\alpha)}\right]^{1/\alpha}$. Using (12), the corresponding equilibrium wage rate in (A.3) and applying $g_{t+1} = 0$, (A.28) can be rewritten as:

$$Y_{t+1} = \hat{\Sigma} A_t n_t^{\alpha/2} \phi, \tag{A.29}$$

which is linearly increasing in ϕ, with $\hat{\Sigma} \equiv [(1 - \alpha)/\alpha]^{1-\alpha} [\alpha/(2 - \alpha)]^{2-\alpha/2}$.

(b) The second part of the Proposition follows from observing that, first, from (A.21) $\tilde{n}$ is decreasing in ϕ; further, for any $n_t > \tilde{n}$, the speed of convergence of n_t toward $\tilde{n}$ (i.e., $a_t^a = 1$, and $a_{t+1}^a < 1$) is decreasing in ϕ. Define the growth rate of n_t, using the function $n_2(n_t)$ in eq. (A.6), as follows:

$$\dot{n} = \frac{n_{t+1}}{n_t} - 1 = \left[\frac{\alpha}{(2-\alpha)n_t}\right]^{1/2} - 1. \tag{A.30}$$

We log-linearize $\dot{n}$ around $\tilde{\tilde{n}}$, by rewriting eq. (A.30) as a function of $\log n_t$

$$\dot{l} = \frac{n_{t+1}}{n_t} - 1 = \left[\frac{\alpha}{(2-\alpha)\, e^{log(n_t)}}\right]^{1/2} - 1, \tag{A.31}$$

and linearizing (A.31) around $\log \tilde{\tilde{n}}$ as follows:

$$\dot{l}_{|\log \tilde{\tilde{n}}} \approx \dot{l}_{|\log \tilde{\tilde{n}}} + \left.\frac{\partial \dot{l}}{\partial \log n_t}\right|_{\log \tilde{\tilde{n}}} (\log n_t - \log \tilde{\tilde{n}}). \tag{A.32}$$

From (A.21) and (A.31),

$$\dot{l}_{|\log \tilde{\tilde{n}}} = \phi^{\frac{1}{2\alpha}} - 1 \tag{A.33}$$

and

$$\left.\frac{\partial \dot{l}}{\partial \log n_t}\right|_{\log \tilde{\tilde{n}}} = -\frac{\phi^{\frac{1}{2\alpha}}}{2} \tag{A.34}$$

such that (A.32) is given by:

$$\dot{l}_{|\log \tilde{\tilde{n}}} = \phi^{\frac{1}{2\alpha}} - 1 - \frac{\phi^{\frac{1}{2\alpha}}}{2}(\log n_t - \log \tilde{\tilde{n}}). \tag{A.35}$$

Finally, from (A.35) the speed of convergence of n_t toward $\tilde{\tilde{n}}$ is given by:

$$s = \frac{\partial \dot{l}_{|\log \tilde{\tilde{n}}}}{\partial \log n_t} = -\frac{\phi^{\frac{1}{2\alpha}}}{2}, \tag{A.36}$$

which is straightforwardly decreasing in ϕ.

Proof of Proposition 9

We start by sketching the main equations of the model. As the threshold a^a is the same for parent owners and workers, the growth rate becomes again $g = 1 - a^a$. Substituting $(1-g)$ in eq. (26),

$$a^\phi = \frac{\phi^{1/\alpha} \pi \left(a^a\right)^{1/\alpha} - p}{w}. \tag{A.37}$$

Since, at the equilibrium, a^a is defined by eq. (27), we use a change of variable argument and substitute $\pi \left(a^a\right)^{1/\alpha}$ in eq. (A.37) from (27), writing

$$a^\phi = \frac{\phi^{1/\alpha}(wa^a + p) - p}{w} = \phi^{1/\alpha} a^a - \frac{p(1-\phi^{1/\alpha})}{w}. \tag{A.38}$$

The market for firms equilibrium is defined by the equality between the supply $L^S = n(a^a - a^\phi)$ and

demand $L^D = (1-n)(1-a^a)$ of firms' licenses, which implies that:

$$a^a = 1 - n + na^\phi. \tag{A.39}$$

Finally, using eqs. (A.38) and (A.39), we can explicitly find the two thresholds as:

$$a^\phi = \frac{(1-n)w\phi^{1/\alpha} - p(1-\phi^{1/\alpha})}{w(1-n\phi^{1/\alpha})}, \tag{A.40}$$

$$a^a = \frac{(1-n)w - np(1-\phi^{1/\alpha})}{w(1-n\phi^{1/\alpha})}, \tag{A.41}$$

where w and p are the wage and price of firms to be found in the aggregate equilibrium. As we have already used the licenses equilibrium equation (A.39) to find out the thresholds, we can recover the firms' price of equilibrium by substituting a^a back from (A.41) into (27). This implies that the firms' price of equilibrium is given as the solution of the implicit equation:

$$P(w,p) = \pi\left[\frac{(1-n)w - np(1-\phi^{1/\alpha})}{w(1-n\phi^{1/\alpha})}\right]^{1/\alpha} - \frac{(1-n)(w+p)}{(1-n\phi^{1/\alpha})} = 0. \tag{A.42}$$

To close the model we need the labor market equilibrium, that is the equilibrium wage rate. From the equality between the supply $H^S(w)$ and demand $H^D(w)$ for workers, the wage of equilibrium is implicitly given by

$$H(w,p) = H^S(w,p) - H^D(w,p) = 0, \tag{A.43}$$

with

$$H^S(w,p) = n\int_{a^\phi}^{a^a} a^i \,\mathrm{d}a^i + (1-n)\int_0^{a^a} a^i \,\mathrm{d}a^i = \frac{(a^a)^2 - n(a^\phi)^2}{2}, \tag{A.44}$$

and

$$\begin{aligned} H^D(w,p) &= \left(\frac{(1-\alpha)A}{w}\right)^{1/\alpha}\left\{n\left[\int_0^{a^\phi}(\phi a^a)^{1/\alpha}\,\mathrm{d}a^i + \int_{a^a}^1 (a^i)^{1/\alpha}\,\mathrm{d}a^i\right] + (1-n)\int_{a^a}^1 (a^i)^{1/\alpha}\,\mathrm{d}a^i\right\} \\ &= \left(\frac{(1-\alpha)A}{w}\right)^{1/\alpha}\left\{n\phi^{1/\alpha}a^\phi(a^a)^{1/\alpha} + \frac{\alpha\left[1-(a^a)^{1+\alpha/\alpha}\right]}{1+\alpha}\right\}, \end{aligned} \tag{A.45}$$

where a^ϕ and a^a are defined in (A.40)-(A.41). The solution of the system of equations (A.42)-(A.43) in the two unknowns w and p returns the pair of equilibrium prices (w^*, p^*) that contemporaneously clear the markets for labor and firms.

Rewriting eq. (A.42) as

$$P^L(w,p) \equiv \pi\left[\frac{(1-n)w - np(1-\phi^{1/\alpha})}{w(1-n\phi^{1/\alpha})}\right]^{1/\alpha} = \frac{(1-n)(w+p)}{(1-n\phi^{1/\alpha})} \equiv P^R(w,p), \tag{A.46}$$

it is immediately verified that $P^L(w,p)$ decreases and $P^R(w,p)$ increases in p in the whole real domain $(-\infty,\infty)$, with $\lim_{p\to-\infty} P^L(w,p) \to \infty$, $\lim_{p\to-\infty} P^R(w,p) \to -\infty$, $\lim_{p\to\infty} P^L(w,p) \to -\infty$ and $\lim_{p\to\infty} P^R(w,p) \to \infty$, guaranteeing the existence of a unique price of equilibrium, for any possible value of the wage rate w.

Likewise, from eqs. (A.43)-(A.44)-(A.45), it follows that, for any price p, $H^S(w,p)$ is increasing and $H^D(w,p)$ decreasing in w (algebraically details below available upon request), hence guaranteeing a unique wage rate of equilibrium.

We then look at the particular equilibrium solution such that the pair (w^*, p^*) is characterized by a positive firms' price $p^* > 0$. Given the features of the functions $P^L(w,p)$ and $P^R(w,p)$, this is the case if $P^L(w, p=0) > P^R(w, p=0)$ which implies that $p^* > 0$ for any equilibrium wage satisfying

$$w < \theta A \left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^{1-\alpha} \equiv w_p. \tag{A.47}$$

Given $\partial H^S(w,p)/\partial w > 0$ and $\partial H^D(w,p)/\partial w < 0$, it follows from eq. (A.43) that the equilibrium wage rate is lower than w_p as long as $H^S(w = w_p, p = 0) > H^D(w = w_p, p = 0)$. Using eqs. (A.40)-(A.41),

$$H^S(w = w_p, p = 0) = \frac{(1-n\phi^{2/\alpha})}{2}\left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^2,$$

and

$$H^D(w = w_p, p = 0) = \left(\frac{1-\alpha}{\alpha}\right)\left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^{\frac{\alpha-1}{\alpha}}\left\{\frac{\alpha}{1+\alpha} - \left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^{\frac{1+\alpha}{\alpha}}\left[\frac{\alpha\left(1-n\phi^{2/\alpha}\right) - n\phi^{2/\alpha}}{1+\alpha}\right]\right\} =$$
$$= \left(\frac{1-\alpha}{1+\alpha}\right)\left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^{\frac{\alpha-1}{\alpha}} - \left(\frac{1-\alpha}{\alpha(1+\alpha)}\right)\left[\frac{1-n}{1-n\phi^{1/\alpha}}\right]^2\left[\alpha\left(1-n\phi^{2/\alpha}\right) - n\phi^{2/\alpha}\right].$$

After rearranging, $H^S(w = w_p, p = 0) > H^D(w = w_p, p = 0)$ if

$$N^L(n) \equiv \left(\frac{1-n}{1-n\phi^{1/\alpha}}\right)^{\frac{2-\alpha}{1-\alpha}}\left[\alpha(3-\alpha) - (2-\alpha)(1+\alpha)n\phi^{2/\alpha}\right] > 2\alpha(1-\alpha) \equiv N^R(n), \tag{A.48}$$

which is, in turn, verified for any $n < \bar{n}$, where $\bar{n}$ is the solution implicitly defined by the equation $N(n) = N^L(n) - N^R(n) = 0$. Since $N^L(0) = \alpha(3-\alpha) > 2\alpha(1-\alpha) = N^R(0)$ and $\partial N^L(n)/\partial n < 0$, and noting that $N^L(n) = 0$ admits two solutions in $n = 1$ and $n = \hat{n}$ with $\bar{n} < \hat{n} < 1$, then $\bar{n}$ exists and is unique, with $\bar{n} < 1$.

For any equilibrium at a positive firms' price $p^* > 0$, we then need to find the conditions separating an equilibrium with polarization from one in which also the crony family firms are sold in the market. Formally, we are interested in the conditions such that for any $a^\phi < \bar{a} < a^a < 1$, $a^\phi > 0$ or $a^\phi \leq 0$.

The first set of conditions, $a^\phi < \bar{a} < a^a < 1$, guarantees that a market for firms is active with positive exchanges of licenses as $a^a < 1$ ensures a positive demand, while $a^\phi < \bar{a} < a^a$ a positive supply of licenses, with $\bar{a} = \phi(1-g) = \phi a^a$. Using (A.38) and (A.41), $a^\phi < \bar{a} < a^a < 1$ holds for any $p > 0$ and $\phi \in (0,1)$, since from (A.41) $a^a < 1 \iff -n(1-\phi^{1/\alpha})(w+p) < 0$, while from (A.38), $a^\phi < \phi a^a \iff \phi^{1/\alpha}a^a - pw^{-1}(1-\phi^{1/\alpha}) < \phi a^a \implies -pw^{-1}(1-\phi^{1/\alpha}) < a^a(\phi - \phi^{1/\alpha})$, which is always verified for any $p > 0$ and $\phi \in (0,1)$ that ensures that the right-hand side is positive $(\phi - \phi^{1/\alpha}) > 0$.

Finally, we can show the conditions separating the polarization equilibrium ($a^\phi > 0$) from that in which also the crony family firms are sold ($a^\phi \leq 0$). Using (A.40), $a^\phi > 0$ for any equilibrium price p such that

$$p < \frac{(1-n)w\phi^{1/\alpha}}{1-\phi^{1/\alpha}} \equiv p_\phi. \tag{A.49}$$

Using (A.49) in (A.46), it follows in turn that $p < p_\phi$ for any equilibrium wage rate satisfying

$$w > \theta A(1-n)^{1-\alpha}\left(1-\phi^{1/\alpha}\right)^{\alpha} \equiv w_\phi \tag{A.50}$$

as $P^L(w, p = p_\phi) < P^R(w, p = p_\phi)$ is verified for $w > w_\phi$.

Then, using (A.43), the equilibrium wage rate is lower than w_ϕ as long as $H^S(w = w_\phi, p = p_\phi) < H^D(w = w_\phi, p = p_\phi)$. Using (A.44)-(A.45),

$$H^S(w = w_\phi, p = p_\phi) = \frac{(1-n)^2}{2}$$

and

$$H^D(w = w_\phi, p = p_\phi) = \frac{(1-\alpha)\left[1-(1-n)^{\frac{1+\alpha}{\alpha}}\right]}{(1+\alpha)(1-n)^{\frac{1-\alpha}{\alpha}}(1-\phi^{1/\alpha})}$$

which imply, after rearranging, that $H^S(w = w_\phi, p = p_\phi) < H^D(w = w_\phi, p = p_\phi)$ if

$$\phi > \left\{1 - \frac{2(1-\alpha)\left[1-(1-n)^{\frac{1+\alpha}{\alpha}}\right]}{(1+\alpha)(1-n)^{\frac{1+\alpha}{\alpha}}}\right\}^{\alpha} \equiv \underline{\phi}, \tag{A.51}$$

with $\underline{\phi} < 1, \forall n$. Summing up, for any $n < \bar{n}$ such that an equilibrium with a market for firms is active at a positive price $p^* > 0$, if $\phi > \underline{\phi}$, $a^\phi > 0$ such that the polarization equilibrium emerges; otherwise, if $\phi \leq \underline{\phi}$, $a^\phi \leq 0$ such that also the crony family firms are sold in the market and all the firms of the economy are managed through entrepreneurial human capital technology.

Finally, note that due to the unitary elasticity of the equilibrium wage rate with respect to the level of the technological frontier A (algebraic details available upon request), in the steady state equilibrium all the endogenous variables (i.e., w^*, p^* and hence $\pi(w^*)$) grow at the endogenous growth rate of technology, g. Formally, since at the equilibrium (w^*, p^*), the wage rate grows at the endogenous growth rate g, then also the profit rate π grows at the same rate g such that from eq. (A.42) also the equilibrium price is on the balanced growth path. Thus, using eqs. (A.40)-(A.41), it results that the thresholds a^ϕ and a^a are constant over time and the distribution invariant.

Proof of Proposition 10

The proof is based on the positive derivative of a^ϕ w.r.t. ϕ. As follows from (A.39), in equilibrium it is verified that

$$\frac{\partial a^a}{\partial \phi} = n\left(\frac{\partial a^\phi}{\partial \phi}\right). \tag{A.52}$$

Then, the derivative w.r.t. ϕ of the share of family firms using crony management, of the share of firms using entrepreneurial human capital and of the growth rate derive immediately from (A.52). Likewise, the derivative of the share of family firms $v^f = a^\phi + 1 - a^a$ w.r.t. ϕ

$$\frac{\partial v^f}{\partial \phi} = (1-n)\left(\frac{\partial a^\phi}{\partial \phi}\right),$$

and that of the number of exchanges

$$\frac{\partial(1-n)(1-a^a)}{\partial\phi} = -n\,(1-n)\left(\frac{\partial a^\phi}{\partial\phi}\right).$$

From (A.40), it follows that

$$\frac{\partial a^\phi}{\partial\phi} = \frac{\phi^{\frac{1}{\alpha}-1}(1-n)\,(w^*+p^*)}{\alpha w^*\left(1-n\phi^{\frac{1}{\alpha}}\right)^2} - \frac{\left(1-\phi^{\frac{1}{\alpha}}\right)\left(w^*p'_\phi - p^*w'_\phi\right)}{(w^*)^2\left(1-n\phi^{\frac{1}{\alpha}}\right)} > 0,$$

since

$$w^*p'_\phi - p^*w'_\phi < 0, \tag{A.53}$$

where w^* and p^* are the wage rate and the license price of equilibrium, and p'_ϕ and w'_ϕ are the total derivatives of the equilibrium wage and price w.r.t ϕ. Totally differentiating (A.42) and (A.43) with respect to ϕ at the equilibrium point (w^*, p^*), then

$$P_w\,w'_\phi + P_p\,p'_\phi = -P_\phi \tag{A.54}$$
$$H_w\,w'_\phi + H_p\,p'_\phi = -H_\phi \tag{A.55}$$

where P_w, P_p, P_ϕ, H_w, H_p and H_ϕ are the partial derivatives w.r.t. w^*, p^* and ϕ of the implicit functions $P(w,p;\phi) = 0$ in (A.42) and $H(w,p;\phi) = 0$ in (A.43). In matrix form, the system of (A.54)-(A.55) is given by

$$\begin{bmatrix} P_w & P_p \\ H_w & H_p \end{bmatrix}\begin{bmatrix} w'_\phi \\ p'_\phi \end{bmatrix} = \begin{bmatrix} -P_\phi \\ -H_\phi \end{bmatrix} \tag{A.56}$$

so that, applying Cramer's rule,

$$w'_\phi \equiv \frac{\mathrm{d}w^*}{\mathrm{d}\phi} = \frac{|J_{w_\phi}|}{|J|} = \frac{\begin{vmatrix} -P_\phi & P_p \\ -H_\phi & H_p \end{vmatrix}}{\begin{vmatrix} P_w & P_p \\ H_w & H_p \end{vmatrix}} = \frac{P_pH_\phi - P_\phi H_p}{P_wH_p - P_pH_w}, \tag{A.57}$$

and

$$p'_\phi \equiv \frac{\mathrm{d}p^*}{\mathrm{d}\phi} = \frac{|J_{p_\phi}|}{|J|} = \frac{\begin{vmatrix} P_w & -P_\phi \\ H_w & -H_\phi \end{vmatrix}}{\begin{vmatrix} P_w & P_p \\ H_w & H_p \end{vmatrix}} = \frac{P_\phi H_w - P_wH_\phi}{P_wH_p - P_pH_w}. \tag{A.58}$$

Noting that the Jacobian $|J|$ of the two endogenous variables w^* and p^* is greater than zero, $|J| > 0$ (algebraic details available upon request), using (A.57)-(A.58) the condition in (A.53) can then be rewritten, after rearranging, as

$$P_\phi\,\left(w^*H_w + p^*H_p\right) < H_\phi\,\left(p^*P_p + w^*P_w\right), \tag{A.59}$$

which can be verified to be always satisfied after substituting

$$P_p \equiv \frac{\partial P(w,p;\phi)}{\partial p} = -\left(\frac{1-n}{1-n\phi^{\frac{1}{\alpha}}}\right)\left\{1+\frac{n\left(1-\phi^{\frac{1}{\alpha}}\right)(w+p)}{\alpha\left[(1-n)w-np\left(1-\phi^{\frac{1}{\alpha}}\right)\right]}\right\}, \tag{A.60}$$

$$P_w \equiv \frac{\partial P(w,p;\phi)}{\partial w} = -\left(\frac{1-n}{1-n\phi^{\frac{1}{\alpha}}}\right)\left\{1+\left(\frac{w+p}{\alpha w}\right)\left[1-\alpha-\frac{np\left(1-\phi^{\frac{1}{\alpha}}\right)}{(1-n)w-np\left(1-\phi^{\frac{1}{\alpha}}\right)}\right]\right\}, \tag{A.61}$$

$$P_\phi \equiv \frac{\partial P(w,p;\phi)}{\partial \phi} = \frac{n(1-n)\,\phi^{\frac{1}{\alpha}-1}(w+p)}{\alpha\left(1-n\phi^{\frac{1}{\alpha}}\right)^2}\left\{\frac{(1-n)(w+p)}{\alpha\left[(1-n)w-np\left(1-\phi^{\frac{1}{\alpha}}\right)\right]}-1\right\}, \tag{A.62}$$

$$H_p \equiv \frac{\partial H(w,p;\phi)}{\partial p} = -\left[\frac{n\left(1-\phi^{\frac{1}{\alpha}}\right)}{w\left(1-n\phi^{\frac{1}{\alpha}}\right)}\right]\left[a^a-a^\phi-\bar{H}\,(a^a)^{\frac{1}{\alpha}}\left(\frac{n\,a^\phi\phi^{\frac{1}{\alpha}}}{\alpha a^a}-\left(1-\phi^{\frac{1}{\alpha}}\right)\right)\right], \tag{A.63}$$

$$\begin{aligned} H_w \equiv \frac{\partial H(w,p;\phi)}{\partial w} = &\left[\frac{n\,p\left(1-\phi^{\frac{1}{\alpha}}\right)}{w^2\left(1-n\phi^{\frac{1}{\alpha}}\right)}\right]\left[a^a-a^\phi-\bar{H}\,(a^a)^{\frac{1}{\alpha}}\left(\frac{n\,a^\phi\phi^{\frac{1}{\alpha}}}{\alpha a^a}-\left(1-\phi^{\frac{1}{\alpha}}\right)\right)\right]+ \\ &+\left(\frac{\bar{H}}{\alpha w}\right)\left[n\,\phi^{\frac{1}{\alpha}}\,a^\phi\,(a^a)^{\frac{1}{\alpha}}+\frac{\alpha\left(1-(a^a)^{\frac{1+\alpha}{\alpha}}\right)}{(1+\alpha)}\right] \end{aligned}, \tag{A.64}$$

$$\begin{aligned} H_\phi \equiv \frac{\partial H(w,p;\phi)}{\partial \phi} = &\frac{n(1-n)\,\phi^{\frac{1}{\alpha}-1}(w+p)}{\alpha\,w\left(1-n\phi^{\frac{1}{\alpha}}\right)^2}\left[a^a-a^\phi-\bar{H}\,(a^a)^{\frac{1}{\alpha}}\left(\frac{n\,a^\phi\phi^{\frac{1}{\alpha}}}{\alpha a^a}-\left(1-\phi^{\frac{1}{\alpha}}\right)\right)\right]+ \\ &-\frac{\bar{H}n\,\phi^{\frac{1}{\alpha}}\,a^\phi\,(a^a)^{\frac{1}{\alpha}}}{\alpha\phi} \end{aligned}, \tag{A.65}$$

where a^ϕ and a^a are given in (A.40)-(A.41), and $\bar{H} = ((1-\alpha)A_{t+1}/w)^{\frac{1}{\alpha}}$.

Proof of Proposition 11

The first part derives by differentiating $\underline{\phi}$ wrt n from eq. (A.51).

The proof of the second part of the Proposition showing the link between the number of firms n and the share of family firms $v^f = a^\phi + 1 - a^a$, the share of family firms using crony management practices $v^{f,\phi} = a^\phi$, the share of firms in the economy using entrepreneurial human capital $v^{f,a} = (1-a^a)/n$, the growth rate $g = 1-a^a$ and the number of firms' exchanges $(1-n)(1-a^a)$, derives from the derivatives of a^ϕ and a^a w.r.t. n. In particular, using (A.40), (A.41), and the equilibrium condition in (A.39),

$$\frac{\partial a^\phi}{\partial n} = -\left(\frac{1-\phi^{\frac{1}{\alpha}}}{w^*(1-n\phi^{\frac{1}{\alpha}})}\right)\left[\frac{\phi^{\frac{1}{\alpha}}(w^*+p^*)}{(1-n\phi^{\frac{1}{\alpha}})}+\frac{w^*p_n'-p^*w_n'}{w^*}\right]>0, \tag{A.66}$$

and

$$\frac{\partial a^a}{\partial n} = n\left(\frac{\partial a^\phi}{\partial n}\right) - (1-a^\phi) = -\left(\frac{1-\phi^{\frac{1}{\alpha}}}{w^*(1-n\phi^{\frac{1}{\alpha}})}\right)\left[\frac{(w^*+p^*)}{(1-n\phi^{\frac{1}{\alpha}})} + \frac{n\,(w^*p'_n - p^*w'_n)}{w^*}\right] > 0, \tag{A.67}$$

where w^* and p^* are the wage rate and the license price of equilibrium, and p'_n and w'_n are the total derivatives of the equilibrium wage and price w.r.t n. Totally differentiating (A.42) and (A.43) with respect to n at the equilibrium point (w^*, p^*), then

$$P_w\, w'_n + P_p\, p'_n = -P_n \tag{A.68}$$

$$H_w\, w'_n + H_p\, p'_n = -H_n, \tag{A.69}$$

where P_n and H_n are the partial derivatives w.r.t. n of the implicit functions $P(w,p;n) = 0$ in (A.42) and $H(w,p;n) = 0$ in (A.43), while P_p, P_w, H_p and H_w are given in equations (A.60)-(A.61)-(A.63)-(A.64). In matrix form, the system of (A.68)-(A.69) is given by

$$\begin{bmatrix} P_w & P_p \\ H_w & H_p \end{bmatrix}\begin{bmatrix} w'_n \\ p'_n \end{bmatrix} = \begin{bmatrix} -P_n \\ -H_n \end{bmatrix} \tag{A.70}$$

so that, applying Cramer's rule,

$$w'_n \equiv \frac{\mathrm{d}w^*}{\mathrm{d}n} = \frac{|J_{w_n}|}{|J|} = \frac{\begin{vmatrix} -P_n & P_p \\ -H_n & H_p \end{vmatrix}}{\begin{vmatrix} P_w & P_p \\ H_w & H_p \end{vmatrix}} = \frac{P_pH_n - P_nH_p}{P_wH_p - P_pH_w}, \tag{A.71}$$

and

$$p'_n \equiv \frac{\mathrm{d}p^*}{\mathrm{d}n} = \frac{|J_{p_n}|}{|J|} = \frac{\begin{vmatrix} P_w & -P_n \\ H_w & -H_n \end{vmatrix}}{\begin{vmatrix} P_w & P_p \\ H_w & H_p \end{vmatrix}} = \frac{P_nH_w - P_wH_n}{P_wH_p - P_pH_w}, \tag{A.72}$$

with

$$P_n \equiv \frac{\partial P(w,p;n)}{\partial n} = \frac{(w+p)\left(1-\phi^{\frac{1}{\alpha}}\right)}{\left(1-n\phi^{\frac{1}{\alpha}}\right)^2}\left\{1 - \frac{(1-n)(w+p)}{\alpha\left[(1-n)w - np\left(1-\phi^{\frac{1}{\alpha}}\right)\right]}\right\}, \tag{A.73}$$

and

$$H_n \equiv \frac{\partial H(w,p;n)}{\partial n} = -\left[\frac{n\,(w+p)\,\phi^{\frac{1}{\alpha}}\left(1-\phi^{\frac{1}{\alpha}}\right)}{w\left(1-n\phi^{\frac{1}{\alpha}}\right)^2}\right]\left[a^a - a^\phi - \bar{H}\,(a^a)^{\frac{1}{\alpha}}\left(\frac{n\,a^\phi\phi^{\frac{1}{\alpha}}}{\alpha a^a} - \left(1-\phi^{\frac{1}{\alpha}}\right)\right)\right] +$$
$$-\frac{\left(a^\phi\right)^2}{2} - a^a\left(1-a^\phi\right) + \bar{H}\,(a^a)^{\frac{1}{\alpha}}\left[\frac{n\,a^\phi(1-a^\phi)\phi^{\frac{1}{\alpha}}}{\alpha a^a} - \left(1-a^\phi\left(1-\phi^{\frac{1}{\alpha}}\right)\right)\right]. \tag{A.74}$$

Then, from (A.66)

$$\frac{\partial a^{\phi}}{\partial n} > 0 \Leftrightarrow \left[\frac{\phi^{\frac{1}{\alpha}} \left(w^* + p^* \right)}{\left(1 - n\phi^{\frac{1}{\alpha}} \right)} + \frac{w^* p'_n - p^* w'_n}{w^*} \right] < 0, \tag{A.75}$$

since, using w'_n from (A.71), p'_n from (A.72), P_n and H_n from (A.73)-(A.74) along with P_p, P_w, H_p and H_w from (A.60)-(A.61)-(A.63)-(A.64), and rearranging, it results that

$$P_n \left(w^* H_w + p^* H_p \right) - H_n \left(w^* P_w + p^* P_p \right) < - \frac{|J| \, w^* \left(w^* + p^* \right) \phi^{\frac{1}{\alpha}}}{1 - n\phi^{\frac{1}{\alpha}}}. \tag{A.76}$$

Finally, from (A.67)

$$\frac{\partial a^{a}}{\partial n} > 0 \Leftrightarrow \left[\frac{\left(w^* + p^* \right)}{\left(1 - n\phi^{\frac{1}{\alpha}} \right)} + \frac{n \left(w^* p'_n - p^* w'_n \right)}{w^*} \right] < 0, \tag{A.77}$$

since, using w'_n from (A.71), p'_n from (A.72), P_n and H_n from (A.73)-(A.74) along with P_p, P_w, H_p and H_w from (A.60)-(A.61)-(A.63)-(A.64), and rearranging, it results that

$$P_n \left(w^* H_w + p^* H_p \right) - H_n \left(w^* P_w + p^* P_p \right) < - \frac{|J| \, w^* \left(w^* + p^* \right)}{n \left(1 - n\phi^{\frac{1}{\alpha}} \right)}. \tag{A.78}$$

Appendix B. Crony society

Throughout the paper we have maintained the assumption $\phi < 1$, that is that the family specific human capital is not extremely productive for doing business. In this appendix we remove this assumption and study the case $\phi \geq 1$. To this end, we need to distinguish two further cases, depending on whether the overall productivity of family specific human capital, $\Phi_{t+1} = \phi\,(1 - g_{t+1})$, is greater or less than 1.

B.1 Education and occupational choices

First, let us define a new relevant wage threshold $\hat{\tilde{w}}_{t+1}$ such that $a^{\phi}_{t+1} = 1$, that is the level of wage for which the parent entrepreneur of the most talented descendant is indifferent between leaving her the company relying on the managerial value of family specific human capital, and steering him/her to a wage earning career. From equation (12) in the paper:

$$\hat{\tilde{w}}_{t+1} = \theta A_{t+1}\phi(1 - g_{t+1}), \tag{B.1}$$

with $\tilde{w} \leq \hat{w} \leq \hat{\tilde{w}}$ for any $\Phi_{t+1} \geq 1$, and $\hat{\tilde{w}} < \hat{w} < \tilde{w}$ for any $\Phi_{t+1} < 1$. Let $\mathring{w} = \max[\hat{w}, \hat{\tilde{w}}]$. Hence,

Proposition B.1. *The educational and occupational choices of parent entrepreneurs are:*

(a) for any $w_{t+1} \leq \mathring{w}$, all descendants continue the family business:

- *(a.1) when $\Phi_{t+1} < 1$, descendants with ability $a^{i}_{t+1} < \bar{a}_{t+1}$ obtain family specific human capital and use crony management technologies, while those with ability $a^{i}_{t+1} \geq \bar{a}_{t+1}$ accumulate and use entrepreneurial human capital;*
- *(a.2) when $\Phi_{t+1} \geq 1$, all descendants obtain family specific human capital and use crony management technologies.*

(b) for any $w_{t+1} > \mathring{w}$, low-ability descendants, those with $a^{i}_{t+1} \leq a^{\phi}_{t+1}$, continue the family firms by exploiting family specific human capital acquired in childhood, while descendants with innate ability $a^{i}_{t+1} > a^{\phi}_{t+1}$ are induced to accumulate general human capital and undertake a wage-earning career;

The educational and occupational choices of parent workers are unaffected by the managerial productivity of family specific human capital, and remain the same as those reported in Proposition 2 for the case $\phi < 1$.

Contrary to the results in Proposition 1 in the paper, if the wage rate is sufficiently low (i.e., $w_{t+1} \leq \mathring{w}$) but the managerial value that society assigns to family name, reputation and connections is sufficiently high (i.e., $\phi \geq 1$), working for a wage becomes the less rewarding alternative and all the heirs retain control of the family businesses. However, when ϕ is not extremely high such that there are some g_{t+1} for which the overall productivity of family specific human capital is still sufficiently small (i.e., $\Phi_{t+1} < 1$), continuing the family firm by investing in the entrepreneurial human capital of the heirs can be an optimal choice for parent entrepreneurs. In this case, the choice depends only on the extent of the productivity of family specific human capital such that heirs with an ability level

lower than $\bar{a}_{t+1}$ continue operating the family businesses using crony management practices, taking advantage of the system of relations inherited from their parents, while those with an ability level higher than $\bar{a}_{t+1}$ receive an entrepreneurial education that they employ in managing the family firms using entrepreneurial management practices (panel 2(a) in the paper). If, instead, ϕ is so high that for any $g_{t+1} \geq 0$ the overall productivity of family specific human capital is always the best way to manage the family business ($\Phi_{t+1} \geq 1$), all the heirs retain the control of the company, exploiting the family specific human capital assimilated from the family. Otherwise, if the market wage is greater than $\hat{w}$, the wage-earning career and accumulation of general human capital are rewarding options for the most talented, who no longer find it profitable to continue the family business by using entrepreneurial human capital due to the sufficiently high level of ϕ.

By contrast, since parent workers have no family specific human capital to transmit to the descendants, the value society assigns to family specific human capital does not directly influence their education and occupational choices, although it indirectly affects their optimal equilibrium choices through the general equilibrium channel.

B.2 Equilibrium and dynamics

Likewise Definition 1 in the paper, the steady-state equilibrium requires that the labor market clears and that ability thresholds, industry size and technology growth rate are constant over time.

Proposition B.2. *A unique competitive equilibrium wage exists such that* $H^S_{t+1}(w_{t+1}) = H^D_{t+1}(w_{t+1})$.

Using the optimal occupational choice from Propositions B.1 and 2 and the definition of the technology growth rate g_{t+1} in eq. (18) in the paper, we have

Lemma B.1. *There exist a* $\bar{\phi} > 1$ *and a* $\bar{n} > 0$ *such that: a) for any* $\phi \in [1, \bar{\phi})$, $\Phi_{t+1} = \phi\,(1 - g_{t+1}(n_t)) \lesseqgtr 1$ *for* $n_t \lesseqgtr \bar{n}$; *b) for any* $\phi \geq \bar{\phi}$, $\Phi_{t+1} = \phi\,(1 - g_{t+1}(n_t)) > 1$ *for all* $n_t \geq 0$.

Hence, the dynamical system governing the evolution of n_t is given by

$$n_{t+1} = \begin{cases} 1 - (1 - n_t)\, a^a_{t+1} & \text{if} \quad n_t < \tilde{\tilde{n}} \\ n_t & \text{if} \quad n_t \in [\tilde{\tilde{n}}, \hat{\tilde{n}}] \\ n_t a^{\phi}_{t+1} & \text{if} \quad n_t > \hat{\tilde{n}}, \end{cases} \tag{B.2}$$

where $\tilde{\tilde{n}}$ is the number of firms for which the equilibrium wage rate is equal to $\tilde{w}$ (i.e., $a^a_{t+1} = 1$), with $\tilde{\tilde{n}} = [\tilde{\tilde{n}}_T, \tilde{\tilde{n}}_C]$ depending on whether $\phi \in [1, \bar{\phi})$ or $\phi \geq \bar{\phi}$, and $\hat{\tilde{n}}_t$ is the number of firms for which the equilibrium wage rate is equal to $\hat{\tilde{w}}_{t+1}$ (i.e., $a^{\phi}_{t+1} = 1$). The corresponding evolution of the growth rate of aggregate technology is given by

$$g_{t+1} = \begin{cases} 1 - \dfrac{(1 - n_t)\, a^a_{t+1}}{1 - n_t \phi} & \text{if} \quad n_t < \tilde{\tilde{n}}_T \quad \text{and} \quad \phi \in [1, \bar{\phi}) \\ (1 - n_t)\,(1 - a^a_{t+1}) & \text{if} \quad n_t < \tilde{\tilde{n}}_C \quad \text{and} \quad \phi \geq \bar{\phi} \\ 0 & \text{otherwise.} \end{cases} \tag{B.3}$$

Proposition B.3. *The number of firms converges to a unique and globally stable steady state* n^*, *indeterminate in the interval* $n^* \in [\tilde{\tilde{n}}, \hat{\tilde{n}}]$. *At the steady state, the economy features no social mobility across occupations and zero growth rate,* $g^* = 0$.

In the crony regime, the economy converges into a fully immobile society, with no entry of new individual firms and where all the family firms are managed by using family specific human capital. The intuition is straightforward. Given the high managerial productivity of family specific human capital, all entrepreneurs transfer the control of firms within the family, introducing their descendants to crony management practices. As an indirect effect, the large number of family firms in the economy sustains the aggregate demand for general human capital and the wage rate, thus inducing parent workers to invest in general rather than entrepreneurial human capital of their children. The social inertia arising from the use of family specific human capital to manage a firm thus eradicates any possible source of entrepreneurial human capital from the economy, wiping out technological advancements and blocking the economy in a zero-growth equilibrium. In this case, marginal changes of ϕ are unable to modify the industry configuration and pull the economy out of the zero-growth trap. Only a socio-institutional shock can put the economy on a positive growth path and create mobility across occupations in society.[1]

The industry dynamics toward the steady state depends on the initial number of firms in the economy. In this case, depending on the extent of ϕ, it can also feature a "falling into cronyism" process, with an endogenous reversal from an entrepreneurial to a crony regime.

Proposition B.4. *For any $n_t > \hat{\tilde{n}}$, the economy converges monotonically to the steady state n^*; during the transition, the entrepreneurial sector is formed by only family firms using family specific human capital and the growth rate of technology is constantly zero.*

If $\phi \in [1, \bar{\phi})$, for any $n_t < \tilde{\tilde{n}}_T$ the economy experiences an endogenous transition from an entrepreneurial to a crony regime, with the total number of firms first monotonically converging and then discretely jumping to the steady state equilibrium $n^* \in [\tilde{\tilde{n}}_T, \hat{\tilde{n}}]$; during the transition, the share of family firms and the proportion of those using crony management practices increase, while the share of firms managed by entrepreneurial human capital and the growth rate decrease to zero.

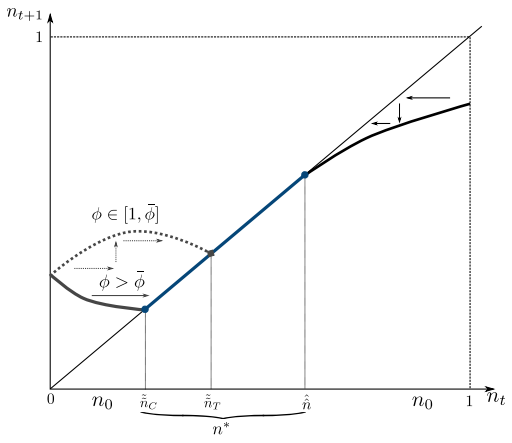
If $\phi \geq \bar{\phi}$, for any $n_t < \tilde{\tilde{n}}_C$, the economy shows no transitional dynamics and the number of firms instantaneously converges to the steady state $n^* \in [\tilde{\tilde{n}}_C, \hat{\tilde{n}}]$.

Figure B.1 illustrates the possible transitional dynamics in a crony society. When the initial number of firms and the market wage rate is high ($n_t > \hat{\tilde{n}}$), the dynamic transition is similar to that analyzed in Section 2.4 in the paper. Also in this case an increase in the productivity of family specific human capital has supportive effects on the aggregate income per capita in the short run. However, unlike the case of an entrepreneurial society, the high level of the productivity of family specific human capital inhibits the managerial take-off and the economy smoothly converges to a crony steady state $n^* = \hat{\tilde{n}}$ with $g^* = 0$.

If $\phi \in [1, \bar{\phi})$ and the initial number of firms is small enough to make $g_0 > (\phi - 1)/\phi$, $n_0 < \tilde{\tilde{n}}_T$, the economy starts from an entrepreneurial regime in which the productivity of family specific human capital is lower than 1; hence, part of family firms' owners invest in their heirs' entrepreneurial

[1] Historical research provides real-world testimonies to this "big-push" hypothesis, such as the different evolution of industrialization in Britain, Japan and Italy after the Second World War. In all three countries the initial boost to industrialization was driven by powerful family firms. However, while in Japan the anti-*zaibatsu* laws passed by the Allied occupiers in the postwar period largely weakened the power of the largest family businesses of the country and the related network of connections, opening the route to the modern *keiretsu* system (Morikawa, 2001; Morck and Nakamura, 2007), and in Britain the economic reforms pursued by the Labor Government at the end of the 1940s, including the sharp rise in the death duty tax rate to 80%, led many family firms to go public and give up the control of the business (Colli and Rose, 1999), in the case of Italy such radical changes never occurred. Even if there were a number of reforms in Italy to reduce the influence of family ownership, their marginal nature was unable to dismantle the pervasiveness of family control and promote modern managerial practices (Amatori, 1997; Colli and Rose, 1999).

Figure B.1: Dynamics: crony society



human capital and there is entry of newly founded entrepreneurial firms. However, the increase in the number of firms in the economy and the consequent increase in labor costs will slow down growth until $g_t = (\phi - 1)/\phi$. This pushes the productivity of the family specific human capital up to the point in which entrepreneurs no longer have an incentive to invest in the entrepreneurial human capital of their heirs, and all the family firms are managed by exploiting the family specific human capital through crony management practices. At this stage, while some entry of new firms allowed by the low wage rate may still sustain a positive growth rate, the economy ceases to evolve smoothly and the total number of firms instantaneously jumps to its steady-state value in the interval $[\tilde{\tilde{n}}_T, \hat{\hat{n}}]$ with a zero growth rate. When this state is reached, the high productivity of family specific human capital dissuades the new generations of family firm leaders from investing in entrepreneurial human capital and the economy is stuck in a socially immobile equilibrium where family firms are perpetuated, using crony management practices.

Finally, if $\phi \geq \bar{\phi}$ and $n_t < \tilde{\tilde{n}}_C$, the economy does not experience any transitional dynamics and the number of firms instantaneously jumps to a steady state equilibrium $n^* \in [\tilde{\tilde{n}}_C, \hat{\hat{n}}]$. This is the case in which the socio-cultural structure of society gives so much importance to family, name, reputation and connections that entrepreneurs have no incentive to invest in the entrepreneurial human capital of their heirs. Moreover, while the initially small size of the entrepreneurial sector allows entry of some new firms and, hence, a positive growth rate, they vanish quickly in the course of only one generation.

B.3 Proofs for Appendix B

Proof of Proposition B.1

Using (10)-(11) and (14)-(15)-(B.1), it follows that:

(a) $w_{t+1} \leq \mathring{w}$. (a.1) When $\Phi_{t+1} < 1$, $\mathring{w} = \hat{w}$ such that $w_{t+1} < \hat{w} \implies a^{\phi}_{t+1} > a^{a}_{t+1}$, which implies that $I^{i,e}_{\phi,t+1} > \max\left\{I^{i,e}_{\omega,t+1}, I^{i,e}_{a,t+1}\right\}$ for $a^{i}_{t+1} < \bar{a}_{t+1}$, while $I^{i,e}_{a,t+1} \geq \max\left\{I^{i,e}_{\omega,t+1}, I^{i,e}_{\phi,t+1}\right\}$ for $a^{i}_{t+1} \geq \bar{a}_{t+1}$; (a.2) when $\Phi_{t+1} \geq 1$, $\mathring{w} = \hat{\hat{w}}$ such that $w_{t+1} < \hat{\hat{w}} \implies a^{\phi}_{t+1} > 1$, which implies that $I^{i,e}_{\phi,t+1} \geq I^{i,e}_{\omega,t+1}$, $\forall\, a^{i}_{t+1} \in [0,1]$.

(b) $w_{t+1} > \mathring{w}$. When $\Phi_{t+1} \geq 1$, $w_{t+1} > \hat{\hat{w}} \implies a^{\phi}_{t+1} < 1 < a^{a}_{t+1}$, which implies that $I^{i,e}_{\phi,t+1} \gtreqless I^{i,e}_{\omega,t+1}$ for $a^{i}_{t+1} \lesseqgtr a^{\phi}_{t+1}$. When $\Phi_{t+1} < 1$, $w_{t+1} > \hat{w} \implies a^{\phi}_{t+1} < 1$ and $a^{\phi}_{t+1} < \bar{a}_{t+1} < a^{a}_{t+1}$; if also $w_{t+1} > \tilde{w}$,

$a^a_{t+1} > 1$ and hence again $a^\phi_{t+1} < 1 < a^a_{t+1}$ gives the result. Otherwise, if $w_{t+1} \in [\hat{w}, \tilde{w}]$, then $a^a_{t+1} < 1$. From Lemma 1, $a^\phi_{t+1} = \phi^{\frac{1}{\alpha}} a^a_{t+1}$; from the assumption that $\phi \geq 1$ this further implies that $a^\phi_{t+1} > a^a_{t+1}$ leading to the contradiction ensuring that when $\Phi_{t+1} < 1$ no equilibrium wage $w_{t+1} \in [\hat{w}, \tilde{w}]$ can exist such that for any wage $w_{t+1} < \tilde{w}$ it must also hold that $w_{t+1} < \hat{w}$.

Proof of Proposition B.2

Using the results according to which when $\Phi_{t+1} < 1$, $w_{t+1} \notin [\hat{w}, \tilde{w}]$ (see point (b) in proof of Proposition B.1), and $w_{t+1} = \tilde{w} \implies a^a_{t+1} = 1 \implies g_{t+1} = 0 \implies \Phi_{t+1} \geq 1$, the aggregate supply and demand of human capital are given by:

$$H^S_{t+1} = \frac{1}{2} \times \begin{cases} (1-n_t)(a^a_{t+1})^2 & \text{if} \quad w_{t+1} < \tilde{w} \\ (1-n_t) & \text{if} \quad w_{t+1} \in [\tilde{w}, \hat{\tilde{w}}] \\ 1 - n_t (a^\phi_{t+1})^2 & \text{if} \quad w_{t+1} > \hat{\tilde{w}}, \end{cases} \tag{B.4}$$

and

$$H^D_{t+1} = \left[\frac{(1-\alpha)\, A_{t+1}}{w_{t+1}}\right] \times \begin{cases} \begin{cases} \dfrac{n_t\, \bar{a}_{t+1}^{\frac{(1+\alpha)}{\alpha}} + \alpha \left[1 - (1-n_t)(a^a_{t+1})^{\frac{(1+\alpha)}{\alpha}}\right]}{1+\alpha} & \text{if } \Phi_{t+1} < 1 \\ n_t\, \bar{a}_{t+1}^{\frac{1}{\alpha}} + \dfrac{\alpha(1-n_t)}{1+\alpha}\left[1 - (a^a_{t+1})^{\frac{(1+\alpha)}{\alpha}}\right] & \text{if } \Phi_{t+1} \geq 1 \end{cases} & \text{if } w_{t+1} < \tilde{w} \\ n_t\, \bar{a}_{t+1}^{\frac{1}{\alpha}} & \text{if } w_{t+1} \in [\tilde{w}, \hat{\tilde{w}}] \\ n_t\, a^\phi_{t+1}\, \bar{a}_{t+1}^{\frac{1}{\alpha}} & \text{if } w_{t+1} > \hat{\tilde{w}}. \end{cases} \tag{B.5}$$

The equilibrium wage schedule is then:

$$w_{t+1} = \theta A_{t+1} \begin{cases} \begin{cases} \left[\dfrac{\alpha + n_t \bar{a}_{t+1}^{\frac{(1+\alpha)}{\alpha}}}{\chi(1-n_t)}\right]^{\frac{\alpha(1-\alpha)}{1+\alpha}} \equiv \omega_1^T(n_t) & \text{if } \Phi_{t+1} < 1 \\ \left[\dfrac{n_t\left(\bar{a}_{t+1}^{\frac{1}{\alpha}}(1+\alpha) - \alpha\right) + \alpha}{\chi(1-n_t)}\right]^{\frac{\alpha(1-\alpha)}{1+\alpha}} \equiv \omega_1^C(n_t) & \text{if } \Phi_{t+1} \geq 1 \end{cases} & \text{and if } n_t < \tilde{\tilde{n}} \\ \bar{a}_{t+1}\left[\dfrac{(1+\alpha)n_t}{(\chi-\alpha)(1-n_t)}\right]^{\alpha} \equiv \omega_2(n_t) & \text{if } n_t \in [\tilde{\tilde{n}}, \hat{\tilde{n}}] \\ \bar{a}_{t+1}\left[\dfrac{(1+\chi)n_t}{\chi-\alpha}\right]^{\alpha/2} \equiv \omega_3(n_t) & \text{if } n_t > \hat{\tilde{n}} \end{cases} \tag{B.6}$$

where $\tilde{\tilde{n}}$ and $\hat{\tilde{n}}$ are defined as the number of firms such that the equilibrium wage rate is equal, respectively, to $\tilde{w}$ (i.e., $a^a = 1$) and $\hat{\tilde{w}}$ (i.e., $a^\phi = 1$), and recall that $\chi = \alpha(3-\alpha)/2(1-\alpha)$.

Proof of Lemma B.1 and Propositions B.3 and B.4

As they are strictly linked, we prove Lemma B.1 and Propositions B.3 and B.4 all together. In particular, when $\phi \geq 1$, we have to distinguish three cases.

Crony path with transition: $\phi \geq 1$ and $n_t > \hat{\tilde{n}}$. When $\phi \geq 1$, for any $n_t > \hat{\tilde{n}}$, the occupational choices imply that the dynamic system of n_t is governed by the equation $n_{t+1} = n_t\, a^\phi_{t+1}$, whose

properties are: $n_{t+1}(\hat{\hat{n}}) = \hat{\hat{n}}$, $n_{t+1}(1) < 1$, with $n_{t+1}(n_t)$ increasing and concave for any $n_t > \hat{\hat{n}}$. Then, for any $n_t > \hat{\hat{n}}$, the system features transitional dynamics toward the unique steady state $n^* = \hat{\hat{n}}$, characterized by social immobility and zero growth rate as $a^{\phi}(\hat{\hat{n}}) > 1$ and $a^{a}(\hat{\hat{n}}) > 1$.

Endogenous transition from entrepreneurial to crony regime: $\phi \in [1, \bar{\phi})$ and $n_t < \tilde{\tilde{n}}_T$. When $\Phi_{t+1} < 1$ and n_t is low enough that $w_{t+1} < \tilde{w}$ such that $a^a_{t+1} < 1$, we have $a^{\phi}_{t+1} > a^a_{t+1}$ since from the proof of Proposition B.1 $w_{t+1} \notin [\hat{w}, \tilde{w}]$ and hence $w_{t+1} < \hat{w}$ for any $w_{t+1} < \tilde{w}$. Hence, the occupational choices and the corresponding distribution of firms and workers imply that the dynamic systems of the number of firms and of the growth rate are given by:

$$n_{t+1} = 1 - (1 - n_t)\, a^a_{t+1}, \tag{B.7}$$

and

$$g_{t+1} = n_t(1 - \phi(1 - g_{t+1})) + (1 - n_t)(1 - a^a_{t+1}), \tag{B.8}$$

which, after rearranging, is given by

$$g_{t+1} = 1 - \frac{(1 - n_t)\, a^a_{t+1}}{1 - n_t \phi}. \tag{B.9}$$

Using (B.7), eq. (B.9) can be rewritten as

$$g_{t+1} = \frac{n_{t+1} - \phi n_t}{1 - \phi n_t}. \tag{B.10}$$

Substituting (B.10) in (B.7), using a^a_{t+1} from eq. (13) in the paper and the corresponding equilibrium wage $\omega_1^T(n_t)$ in (B.6), the dynamic systems of the number of firms and of the growth rate are explicitly given by

$$n_{t+1} = 1 - (1 - \phi n_t) \left[\frac{\alpha (1 - n_t)^{1/\alpha}}{\chi (1 - \phi n_t)^{\frac{1+\alpha}{\alpha}} - (1 - n_t)^{1/\alpha} n_t \phi^{\frac{1+\alpha}{\alpha}}} \right]^{\frac{\alpha}{1+\alpha}} \equiv n^T(n_t), \tag{B.11}$$

and

$$g_{t+1} = 1 - \left[\frac{\alpha (1 - n_t)^{1/\alpha}}{\chi (1 - \phi n_t)^{\frac{1+\alpha}{\alpha}} - (1 - n_t)^{1/\alpha} n_t \phi^{\frac{1+\alpha}{\alpha}}} \right]^{\frac{\alpha}{1+\alpha}} \equiv g^T(n_t). \tag{B.12}$$

Finally, substituting back (B.12) and $\omega_1^T(n_t)$ from (B.6) in (12) and (13), the thresholds a^{ϕ}_{t+1} and a^a_{t+1} can be explicitly written as

$$a^{\phi}_{t+1} = \phi^{\frac{1}{\alpha}} \left(\frac{1 - n_t}{1 - \phi n_t} \right)^{\frac{1-\alpha}{\alpha}} \left[\frac{\alpha (1 - n_t)^{1/\alpha}}{\chi (1 - \phi n_t)^{\frac{1+\alpha}{\alpha}} - (1 - n_t)^{1/\alpha} n_t \phi^{\frac{1+\alpha}{\alpha}}} \right]^{\frac{\alpha}{1+\alpha}} \tag{B.13}$$

and

$$a^a_{t+1} = (1 - \phi n_t) \left[\frac{\alpha}{(1 - n_t) \left(\chi (1 - \phi n_t)^{\frac{1+\alpha}{\alpha}} - (1 - n_t)^{1/\alpha} n_t \phi^{\frac{1+\alpha}{\alpha}} \right)} \right]^{\frac{\alpha}{1+\alpha}}. \tag{B.14}$$

Consistently, $a^{\phi}_{t+1} > a^a_{t+1}$ holds for $\phi > 1$. Using (B.12), $\Phi_{t+1} = \phi(1 - g_{t+1}) < 1$ as long as

$$\phi^{\frac{1+\alpha}{\alpha}} (1 - n_t)^{\frac{1}{\alpha}} (\alpha + n_t) < \chi \, (1 - n_t \phi)^{\frac{1+\alpha}{\alpha}}. \tag{B.15}$$

The necessary condition ensuring that (B.15) is satisfied at least for some $g_{t+1} \geq 0 \Leftrightarrow n_t \geq 0$ can be derived by imposing the maximum value that g_{t+1} can assume (i.e., the minimum value of $1 - g_{t+1}$). Since g_{t+1} is a monotonically decreasing function of n_t, the max $(g_{t+1}(n_t) : n_t = 0, ..., 1)$ is in $n_t = 0$. Using $n_t = 0$ in (B.15), it follows that $\phi(1 - g_{t+1}) < 1$ for some $n_t > 0$ if

$$\phi < \left(\frac{\chi}{\alpha}\right)^{\frac{\alpha}{1+\alpha}} \equiv \bar{\phi}, \tag{B.16}$$

with $\bar{\phi} > 1$. Then, for $\phi < \bar{\phi}$, the properties of the function $g_{t+1} = g^T(n_t)$ ensure that an $\bar{n}$ must exist such that $\phi(1 - g_{t+1}(\bar{n})) = 1$. Formally, $\bar{n}$ is implicitly defined by the condition in (B.15) verified with equality, $\phi^{\frac{1+\alpha}{\alpha}}(1 - \bar{n})^{\frac{1}{\alpha}}(\alpha + \bar{n}) = \chi(1 - \bar{n}\phi)^{\frac{1+\alpha}{\alpha}}$. For $n_t < \bar{n} \implies \bar{a}_{t+1} < 1$, $a^{\phi}_{t+1} > \bar{a}_{t+1} > a^{a}_{t+1}$ holds. Let $\tilde{\tilde{n}}_T$ stand for the number of firms such that, for $\phi \in [1, \bar{\phi})$, $a^a(\tilde{\tilde{n}}_T) = 1$, with $\bar{n} < \tilde{\tilde{n}}_T$ from (B.14).

The properties of the dynamic system in (B.11) are as follows: $n^T(0) = 1 - (\alpha/\chi)^{\alpha/1+\alpha} \in [0, 1]$; $n_{t+1} = n_t$ in $n_t = \tilde{\tilde{n}}_T$, that is $n^T(\tilde{\tilde{n}}_T) = \tilde{\tilde{n}}_T$, with $n_{t+1} \gtrless n_t$ for any $n_t \lessgtr \tilde{\tilde{n}}_T$; $\partial n^T(n_t)/\partial n_t \gtrless 0$ for any $n_t \lessgtr \ddot{n}$, with $\ddot{n} < \bar{n} < \tilde{\tilde{n}}_T$. These properties ensure that the law of motion in (B.11) admits a uniquely indeterminate steady state in the interval $n^* \in [\tilde{\tilde{n}}_T, \hat{\tilde{n}}]$, with the growth rate $g^*(n^*) = 0$, as $a^a(n^*) \geq 1$. For any $n_0 < \bar{n}$, the system features transition dynamics endogenously evolving from a state in which $\phi(1 - g_{t+1}) < 1$ to one in which $\phi(1 - g_{t+1}) \geq 1$, then discretely jumping to the steady state $n^* \in [\hat{\tilde{n}}, \tilde{\tilde{n}}]$.

Crony path with no transition: $\phi \geq \bar{\phi}$ and $n_t < \tilde{\tilde{n}}_C$. As follows from condition (B.15), for any $\phi \geq \bar{\phi}$ and $n_t \geq 0$, $\phi(1 - g_{t+1}) > 1$ holds.

When $\Phi_{t+1} \geq 1$ and n_t is low enough that $w_{t+1} < \tilde{w}$ such that $a^a_{t+1} < 1$, we have that $a^a_{t+1} < 1 < \bar{a}_{t+1} < a^{\phi}_{t+1}$. Hence, the occupational choices and the corresponding distribution of firms and workers imply that the dynamic systems of the number of firms and of the growth rate are given by:

$$n_{t+1} = 1 - (1 - n_t)\, a^a_{t+1} \tag{B.17}$$

and

$$g_{t+1} = (1 - n_t)\,(1 - a^a_{t+1}), \tag{B.18}$$

that, using (B.17), can be rewritten as

$$g_{t+1} = n_{t+1} - n_t. \tag{B.19}$$

Substituting (B.19) in (B.17), using eq. (13) and the corresponding equilibrium wage $\omega^C_1(n_t)$ in (B.6), the dynamic system of the number of firms is given by the implicit function

$$n_{t+1} = 1 - (1 - n_t)\left[\frac{(1+\alpha)n_t\phi^{1/\alpha}(1 + n_t - n_{t+1})^{1/\alpha} + \alpha(1 - n_t)}{\chi(1 - n_t)}\right]^{\frac{\alpha}{1+\alpha}} \equiv n^C(n_t), \tag{B.20}$$

Let $\tilde{\tilde{n}}_C$ be the number of firms such that, for $\phi \geq \bar{\phi}$, $a^a(\tilde{\tilde{n}}_C) = 1$, eq. (B.20) is characterized by the following properties: $n^C(0) = 1 - (\alpha/\chi)^{\alpha/1+\alpha} \in [0, 1]$; $n_{t+1} = n_t$ in $n_t = \tilde{\tilde{n}}_C$, that is $n^C(\tilde{\tilde{n}}_C) = \tilde{\tilde{n}}_C$; $\partial n^C(n_t)/\partial n_t < 0$. Hence, for any $n_t < \tilde{\tilde{n}}_C$, the economy jumps without transition into the interval $[\tilde{\tilde{n}}_C, \hat{\tilde{n}}]$, with an indeterminate steady state number of firms n^* and a growth rate $g^* = 0$.

Appendix C. Generalizing the growth rate function

C.1 Aggregate entrepreneurial human capital

In this Appendix we assume that the growth rate of aggregate technology, g, increases with the total entrepreneurial human capital in the economy rather than with the fraction of firms in the population using entrepreneurial management practices.

Since the managerial capital function is the same as in the basic model, the occupational and educational choices are unchanged. In particular, workers' descendants and entrepreneurs' heirs with ability higher than $a^a_{t+1} = (w_{t+1}/\theta A_{t+1})^{1/(1-\alpha)}$ are geared toward the entrepreneurial career by employing all their time endowment in accumulating entrepreneurial human capital ($\tau^i = 1$), while entrepreneurs' heirs with ability lower than $a^\phi_{t+1} = (\phi(1-g_{t+1})\theta A_{t+1}/w_{t+1})^{1/\alpha}$ continue the family firms by relying on family specific human capital ($\tau^i = 0$). All the other individuals become workers. Then, recalling that ability is uniformly distributed in the interval (0, 1), we have:

$$g_{t+1} = \int_{a^a_{t+1}}^{1} \tau^i \, a^i_{t+1} \, \mathrm{d}a^i_{t+1} = \frac{1-(a^a_{t+1})^2}{2}. \tag{C.1}$$

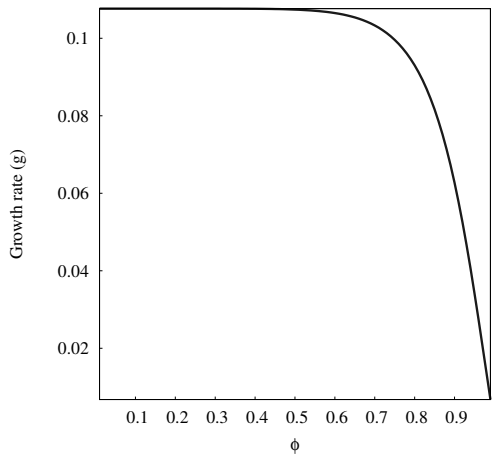
C.1.1 Steady state

Due to analytic intractability, in this case we numerically simulate the model and compute the steady state values for the growth rate of aggregate technology (g^*), the total number of firms (n^*), the shares of family and non-family (ν^f and ν^{nf}) firms and the ratio between the family firms using crony management practices and those using entrepreneurial management practices ($\rho = a^\phi/(1-a^a)$), varying the exogenous component of the productivity of the family specific human capital ϕ. The only parameter we have to set is α, which governs the degree of span of control. We do not calibrate it, but we try with a set of possible values for α suggested in the literature ranging from 0.1 to 0.5 (for instance Buera et al., 2011; Gennaioli et al., 2013; Hsieh and Klenow, 2009). Simulation results for an intermediate value of $\alpha = 0.25$ are shown in Figure C.1.

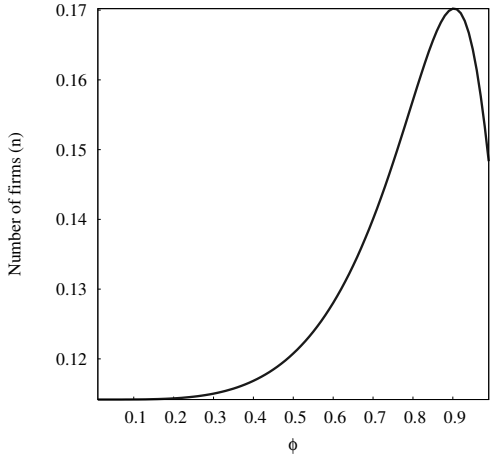
Consistent with Proposition 5 in the basic model, panel (a) shows the negative relation between the steady state growth rate and the productivity of the family specific human capital. This is generated by the selection effect of ϕ on occupational and educational choices. An increase in the productivity of family specific human capital raises the share of family firms in the economy and reduces the share of non-family firms (panel (c)). The former effect, in particular, is driven by the reduction in the share of family firms managed through the accumulation of entrepreneurial human capital and the increase in the share of family firms managed by exploiting the family specific human capital (panel (d)). Thus the total quantity of entrepreneurial human capital in the economy and the growth rate shrink.

These correlations are qualitatively robust to variations in the degree of span-of-control (results are available upon request). Quantitatively, for any given level of ϕ, a greater span-of-control (a lower α) reduces profits at any level of managerial capital, as this matters less for determining the scale and productivity of firms. This implies that all individuals, including the most talented ones, are less

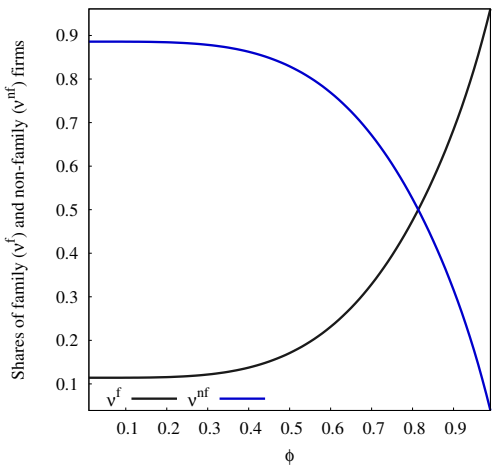
Figure C.1: Simulations ($\alpha = 0.25$)



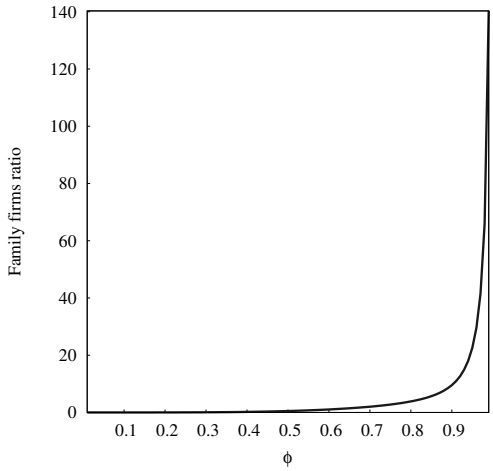
(a) g^*



(b) n^*



(c) Shares of family (ν^f) and non-family (ν^{nf}) firms



(d) Family firms ratio (ρ)

prone to enter the entrepreneurial career and accumulate entrepreneurial human capital, generating a decrease in the number of firms and the growth rate. Moreover, since managerial capital matters less for determining the firms' outcome, also the role of the family specific human capital shrinks, inducing a corresponding decrease in the share of family firms.

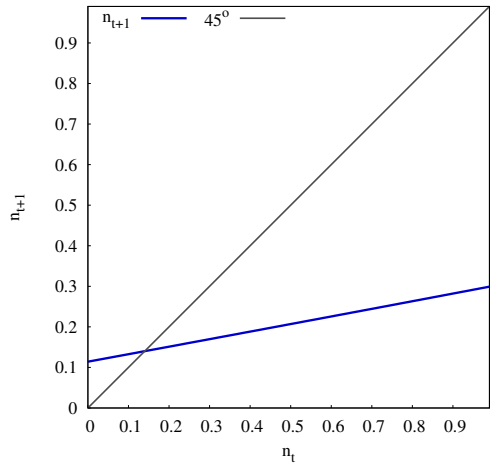
C.1.2 Dynamics

For any given ϕ and any initial industry size n_0, the dynamics toward the steady state is identified by the sequence of intra-temporal equilibria characterized by the ability thresholds (i.e., wage rate) clearing the labor market. Hence, the inter-temporal equilibrium is obtained by iterating over time using the dynamic equation of the number of firms (see equation (22) in the paper).

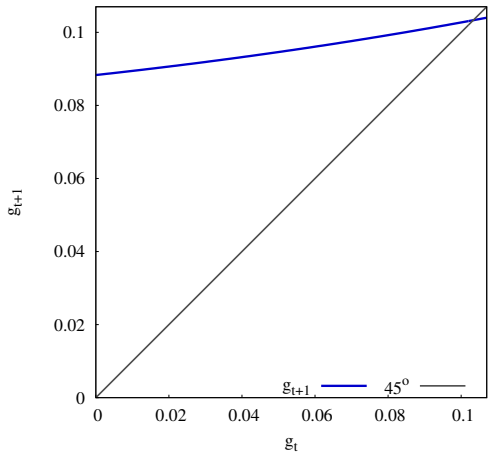
Simulations for $\phi = 0.7$ are shown in Figure C.2 (results are robust to changes in $\phi \in (0,1)$). In line with the adjustment process of the basic model, panels (a) and (b) show a monotonic convergence toward the unique globally stable steady state n^* and g^*.[2] The main variables of the model adjust

[2]For $\alpha = 0.25$ and $\phi = 0.7$, the admissible range of n_t is the whole domain $n_t \in (0,1)$ (i.e., $\tilde{n} > 1$), such that the

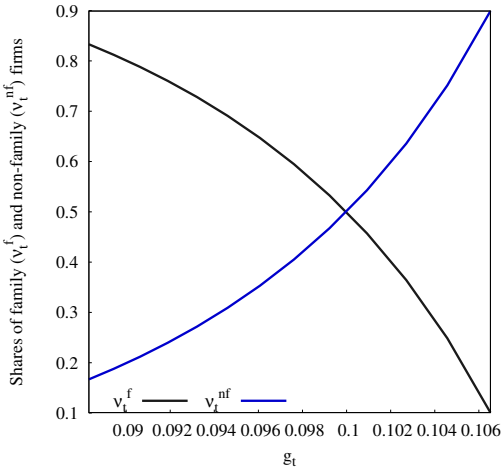
Figure C.2: Simulations of the dynamical process ($\alpha = 0.25, \phi = 0.7$)



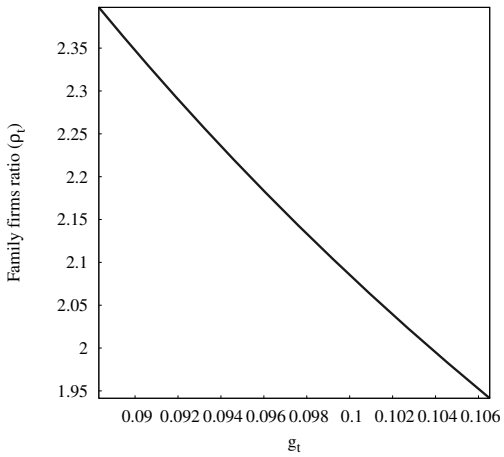
(a) Dynamic equation of n_{t+1}



(b) Dynamic equation of $g_{t+1} = G(g_t)$



(c) Shares of family (ν_t^f) and non-family (ν_t^{nf}) firms



(d) Family firms ratio (ρ_t)

correspondingly. An economy in the early stages of development ($g_t \approx 0$) is characterized by a large number of small firms, predominantly constituted by family firms exploiting family specific human capital. Over time, the economy evolves toward its steady state, with a monotonically increasing growth rate (panel (b)). The resulting reduction in the productivity of the family specific human capital generates a decrease in the share of family firms (panel (c)) driven by the decrease in the share of family firms managed using family specific human capital and the increase in the share of family firms managed through entrepreneurial human capital (panel (d)).

thresholds a^{ϕ}_{t+1} and a^{a}_{t+1} are interior throughout, ensuring positive entry and exit of firms in any period.

Appendix D. Generalizing the managerial capital function

D.1 Family specific and entrepreneurial human capital as imperfect substitutes

In this appendix we relax the assumption of perfect substitutability between family specific and entrepreneurial human capital in the management of family firms by replacing the managerial capital function of the basic model (see equation (5)) with a more general CES formulation:

$$m_{t+1}^{i} = \left[\left(\tau_{t+1}^{i} a_{t+1}^{i} \right)^{\frac{\sigma-1}{\sigma}} + \iota \left((1-\tau_{t+1}^{i}) \phi (1-g_{t+1}) \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{D.1}$$

where σ is the elasticity of substitution between the two managerial inputs inversely measuring the degree of complementarity between the two managerial factors,[3] τ^i and $1-\tau^i$ are the time spent by children in acquiring entrepreneurial and family specific human capital, respectively, and ι is the usual indicator variable for the firm type (1 for family and 0 for non-family firms). This functional form, while keeping the hypothesis that family and non-family firms differ in the fact that family entrepreneurs have exclusive access to family specific human capital, admits that the family specific human capital supports the productivity of entrepreneurial human capital as well.[4] We start by assuming $\sigma > 1$, such that the two managerial inputs are imperfect substitutes. Then we discuss the robustness to the more extreme case of unitary elasticity of substitution.

As in the basic model, parents choose education and occupation for their children. Since parent workers do not have family specific human capital to transfer to descendants, their occupational choice is still governed by the unique threshold ability $a_{t+1}^{a} \equiv a_{t+1}^{NF}$ (see equation (13) in the main text)

$$a_{t+1}^{NF} = \left(\frac{w_{t+1}}{\pi_{t+1}} \right)^{\frac{\alpha}{1-\alpha}} = \left(\frac{w_{t+1}}{\theta A_{t+1}} \right)^{\frac{1}{1-\alpha}}, \tag{D.2}$$

such that descendants with ability higher than a_{t+1}^{NF} undertake an entrepreneurial career, or else work for a wage. By contrast, conditional on keeping the control of the family firm within the family, parent entrepreneurs choose the amount of time descendants spend on acquiring entrepreneurial and family specific human capital with the aim of maximizing the firm's managerial capital (D.1) and profits:

$$(\tau_{t+1}^{i})^{*} = \frac{\left(a_{t+1}^{i}\right)^{\beta}}{\left(\phi(1-g_{t+1})\right)^{\beta} + \left(a_{t+1}^{i}\right)^{\beta}}, \tag{D.3}$$

[3] It is interesting to note that how complementary family specific and entrepreneurial human capital are also depends on the workings of society, and the importance it attributes to the family specific human capital for doing business.

[4] Results are qualitatively the same if we assume that family specific and entrepreneurial human capital enter the managerial capital function of family firms with different weights, such that: $m_{t+1}^{i} = [(1-\iota\mu)(\tau^{i} a_{t+1}^{i})^{\frac{\sigma-1}{\sigma}} + \iota\mu((1-\tau^{i})\phi(1-g_{t+1}))^{\frac{\sigma-1}{\sigma}}]^{\frac{\sigma}{\sigma-1}}$. For the sake of comparison with the basic model (as σ approaches infinity, the CES formulation in (D.1) coincides with equation (5) in the main text), we present simulations based on equation (D.1). The consequences of allowing different weights on the two inputs of the managerial capital function can be interpreted in light of the effects on the relative marginal productivity of the family specific human capital with respect to entrepreneurial human capital, with increases in μ strengthening the productivity of the former.

with $\beta = \sigma - 1$. Substituting the optimal time solutions (D.3) into (D.1), the optimal managerial capital of family firms is:

$$m_{t+1}^{i} = \left[(a_{t+1}^{i})^{\beta} + \iota \left(\phi(1 - g_{t+1}) \right)^{\beta} \right]^{\frac{1}{\beta}}. \tag{D.4}$$

Unlike the basic model, the optimal managerial capital of family firms is no longer a piecewise function revealing the exclusive acquisition and use in the company's management of family specific or entrepreneurial human capital, but it is represented by the continuous nonlinear function of these two factors in (D.4).[5] This reflects the dual role of the family specific human capital as an insurance factor that ensures a positive lower bound to family firms' managerial capital and profitability, and as a positive support to the entrepreneurial ability of the family descendant at the helm of the family company. Hence, since the family specific human capital also increases the managerial productivity of entrepreneurs' descendants investing in entrepreneurial human capital, the innate ability of the marginal family entrepreneur using entrepreneurial management practices is lower than the ability of the marginal new entrepreneur, $a_{t+1}^{a,F} < a_{t+1}^{a,NF}$. Due to the nonlinearity of the managerial capital function (D.4), the occupational choices of the parent entrepreneurs are only implicitly determined by the usual indifference condition between wage- and profit-income

$$w_{t+1} a_{t+1}^{i} = \pi_{t+1} \left(m_{t+1}^{i} \right)^{\frac{1}{\alpha}}. \tag{D.5}$$

Lemma D.1. *For $\iota = 1$, the function m is such that: (i) $m_{|a^i=0} > 0$; (ii) $\partial m / \partial a^i > 0$; (iii) $\partial^2 m / \partial (a^i)^2 \gtrless 0$ for any $a_{t+1}^{i} \gtrless \bar{a} \equiv \phi(1 - g_{t+1})[\alpha(2-\sigma)/(1-\alpha)]^{1/(\sigma-1)}$, with $\bar{a} < 1$ for any $\phi \in (0,1)$ and $\alpha \leq 0.5$; (iv) $\partial m / \partial \phi > 0$.*

Lemma D.1 implies that the indifference condition in (D.5) can have either two solutions, compatible with an equilibrium with entry and exit, or one or no solution, compatible with equilibria without mobility. We focus on the case in which the productivity of family specific human capital is not so high as to exclude the existence of an equilibrium with positive entry and exit. In this case, the two solutions satisfying the income-indifference condition in (D.5) are implicitly given by

$$\left[(\phi(1 - g_{t+1}))^{\beta} + (a_{t+1}^{\phi})^{\beta} \right]^{\frac{1}{\alpha\beta}} = \left(\frac{w_{t+1}}{\pi_{t+1}} \right) a_{t+1}^{\phi} \tag{D.6}$$

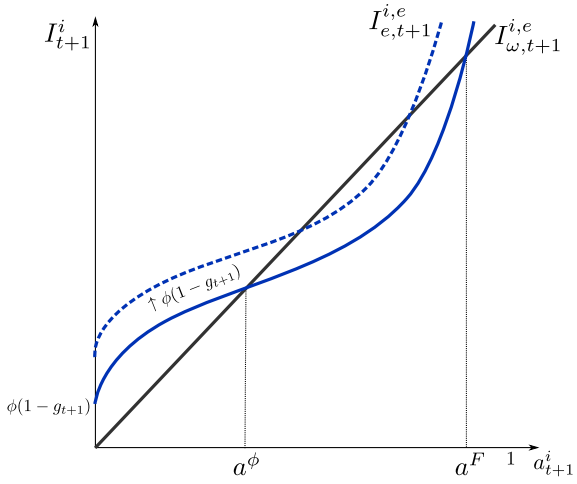
$$\left[(\phi(1 - g_{t+1}))^{\beta} + (a_{t+1}^{F})^{\beta} \right]^{\frac{1}{\alpha\beta}} = \left(\frac{w_{t+1}}{\pi_{t+1}} \right) a_{t+1}^{F}, \tag{D.7}$$

with $a_{t+1}^{F} > a_{t+1}^{\phi}$ to be verified in equilibrium. For heirs with innate ability lower than a^{ϕ} and higher than a^{F} parent entrepreneurs decide to continue the firm within the family. Otherwise, for descendants of intermediate ability, parent entrepreneurs shut the firm down, inducing children to accumulate general human capital and work for a wage (Figure D.1).

Unlike the basic model, when family specific and entrepreneurial human capital are not perfect substitutes, family firms cannot be discretely differentiated as crony or entrepreneurial according to the type of management practices employed. By contrast, all the family firms are managed by using both family specific and entrepreneurial human capital, although at a different level of intensity, which depends on the innate ability of the descendant who continues the family firm: descendants

[5] For any given elasticity σ between the time inputs, the optimal managerial capital presents an "actual" elasticity of substitution between family specific human capital and entrepreneurial ability equal to $\epsilon = 1/(2-\sigma)$, which is greater than 1 for any $\sigma \in (1,2)$, and equal to 1 for $\sigma = 1$.

Figure D.1: Occupational choices of parent entrepreneurs



with a little talent rely more on, and invest more time in, the accumulation of family specific rather than entrepreneurial human capital, while the reverse is true for highly talented descendants.

In this context, the dynamics of firms in the industry is given by:

$$\begin{aligned} n_{t+1} &= n_t a^\phi_{t+1} + n_t(1-a^F_{t+1}) + (1-n_t)(1-a^{NF}_{t+1}) = \\ &= n_t a^\phi_{t+1} + 1 - \left[n_t a^F_{t+1} + (1-n_t)a^{NF}_{t+1}\right], \end{aligned} \tag{D.8}$$

such that, in steady-state, the entry-exit equilibrium condition is:

$$n = \frac{1-a^{NF}}{1-a^{NF}+a^F-a^\phi}. \tag{D.9}$$

The labor market equilibrium, $H^S_{t+1} = H^D_{t+1}$, is given by:

$$\begin{aligned} \frac{n_t\left[(a^F_{t+1})^2-(a^\phi_{t+1})^2\right]+(1-n_t)(a^{NF}_{t+1})^2}{2} = \left[\frac{(1-\alpha)}{\alpha(a^{NF}_{t+1})^{\frac{1-\alpha}{\alpha}}}\right]\Bigg\{ & n_t\int_0^{a^\phi_{t+1}}\left(m^i_{t+1}\right)^{\frac{1}{\alpha}}\,\mathrm{d}a^i_{t+1} + \\ & n_t\int_{a^F_{t+1}}^1 (m^i_{t+1})^{\frac{1}{\alpha}}\,\mathrm{d}a^i_{t+1} + (1-n_t)\int_{a^{NF}_{t+1}}^1 (a^i_{t+1})^{\frac{1}{\alpha}}\,\mathrm{d}a^i_{t+1}\Bigg\}. \end{aligned} \tag{D.10}$$

Finally, assuming that the growth rate of aggregate technology depends on the total entrepreneurial human capital, and using the optimal time solution (D.3), we have:

$$g_{t+1} = n_t\left[\int_0^{a^\phi_{t+1}}(\tau^i_{t+1})^*\,a^i_{t+1}\,\mathrm{d}a^i_{t+1} + \int_{a^F_{t+1}}^1 (\tau^i_{t+1})^*\,a^i_{t+1}\,\mathrm{d}a^i_{t+1}\right] + \frac{(1-n_t)\left(1-(a^{NF}_{t+1})^2\right)}{2}. \tag{D.11}$$

In this case, the least talented heirs contribute to the aggregate growth rate as well as those most talented, albeit with a lower level of entrepreneurial human capital determined by both their low innate ability and low investment in entrepreneurial education.

D.1.1 Steady state

The steady state equilibrium is defined as in the basic model as the tuple $\{w_t, n_t, a_t^{\phi}, a_t^F, a_t^{NF}, g_t\}_{t=\kappa}^{\infty}$ which, for each t, solves the system of equations (D.2)-(D.6)-(D.7)-(D.10)-(D.9)-(D.11) under the constraints $n \in (0,1)$ and $1 > a_t^F > a_t^{\phi}$, ensuring positive entry and exit. In order to numerically compute how the steady state changes with the productivity of family specific human capital ϕ, we need to set the span-of-control and elasticity parameters α and σ.[6] Simulations for $\alpha = 0.25$ and $\sigma = 1.4$ are reported in Figure D.2, but results are robust to different values of span-of-control and elasticity of substitution. As in the basic model, we focus on equilibria with positive firm entry and exit. The interval of values of ϕ for which there is firm entry and exit (and social mobility) in equilibrium is narrower than that in the perfect substitution case, as the family specific human capital now also contributes to entrepreneurial human capital.[7]

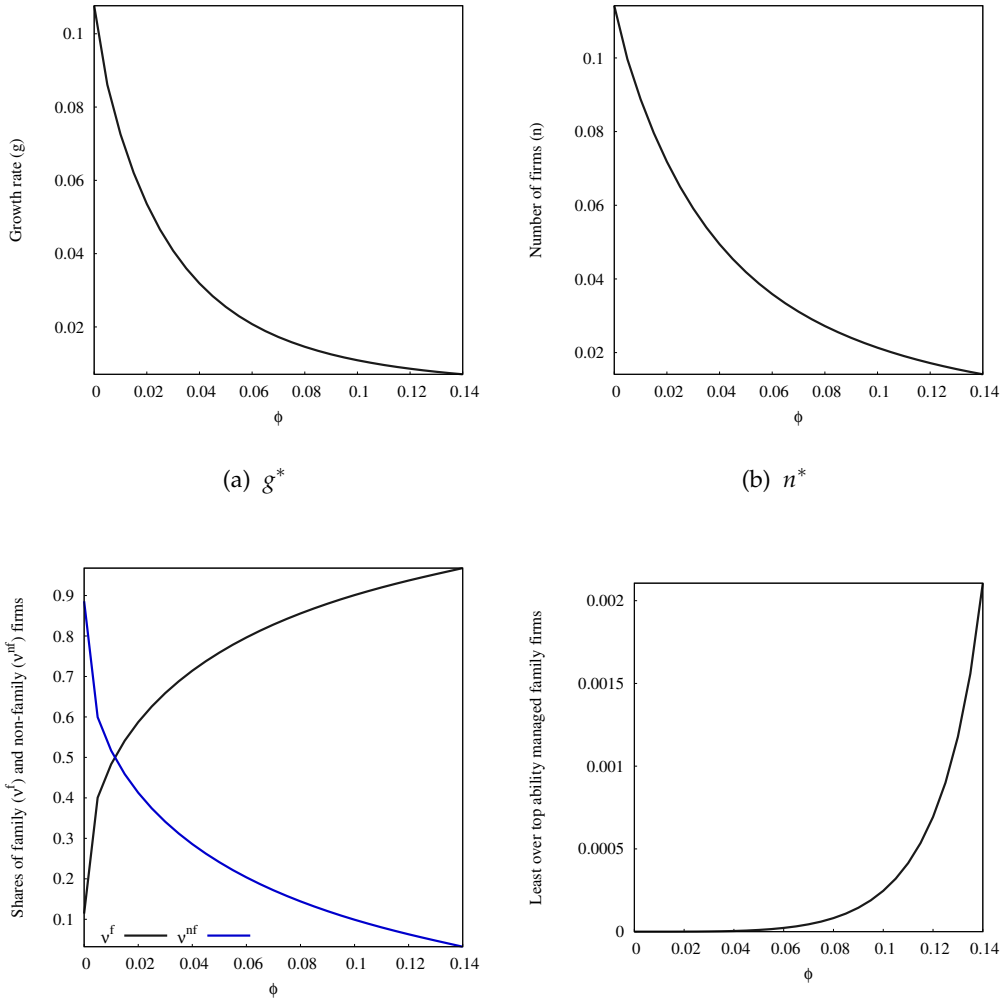
All results are qualitatively identical to the case of perfect substitution reported in Figure C.1, although under imperfect substitution the family specific human capital has contrasting effects on the growth rate. As in the basic model, an increase in the productivity of the family specific human capital has negative selection and education effects on economic growth by reducing the mass of individuals at the top of the ability distribution founding a new enterprise (i.e., the share of non-family firms in the economy; panel D.2(c)) and the investment in entrepreneurial human capital by entrepreneurs' descendants (see equation (D.3)). However, the family specific human capital also supports the marginal productivity of the entrepreneurial human capital employed in family firms, and this produces a positive scale effect on the steady-state growth rate by increasing the share of family firms continuing the business through generations (panel D.2(c)). On the whole, the education and selection effects are always stronger than the scale effect, justifying the negative association between the productivity of the family specific human capital and the growth rate displayed in Figure D.2(a). This can be explained by two mechanisms. Due to the higher time investment in family specific human capital of the low-ability individuals with respect to their high-ability counterparts, an increase in the productivity of the family specific human capital benefits particularly the mass of least talented heirs. Hence, as ϕ increases the family firms' ratio, the ratio between family firms managed by the lowest and highest talented heirs, increases (panel D.2(d)). Further, since the productivity of the family specific human capital also increases the marginal productivity of entrepreneurial human capital of all the firms' heirs, $a_{t+1}^F < a_{t+1}^{NF}$ holds such that the highest talented marginal heirs continuing the family business have a lower entrepreneurial ability than the marginal workers' descendants. These two mechanisms explain why the positive effect of the productivity of the family specific human capital on the growth rate is outweighed by the negative effect such that the net effect is the negative correlation shown in panel D.2(a).

The simulation results are robust to variations in the degree of span-of-control and elasticity of substitution σ. Quantitatively, for any given level of α and ϕ, a reduction in the elasticity of substitution implies a lower growth rate and total fraction of firms in the economy, accompanied by a higher share of family firms. This is because in societies in which the elasticity of substitution is lower the

[6] The only technical constraint we need to impose is that the product $\alpha \times (\sigma - 1)$ is a positive integer, in order that the integrand in (D.10) is a polynomial and integration over a_{t+1}^i has a closed, numerically tractable, solution. Otherwise, integration involves solutions over hyper-geometric functions which are numerically intractable.

[7] Specifically, in this case an upper limit $\bar{\phi} \in (0,1)$ can be numerically identified such that for any $\phi \geq \bar{\phi}$, there is no mobility across sectors and the growth rate is stuck at its minimum (which, unlike the perfect substitution case, is greater than zero since all family entrepreneurs manage their company with a minimum level of entrepreneurial human capital). For the parameter configuration used for simulations in figure D.2 we have that $\bar{\phi} \approx 0.154$.

Figure D.2: Simulations ($\alpha = 0.25$, $\sigma = 1.4$)



(a) g^*

(b) n^*

(c) Shares of family and non-family firms

(d) Family firms ratio (ρ)

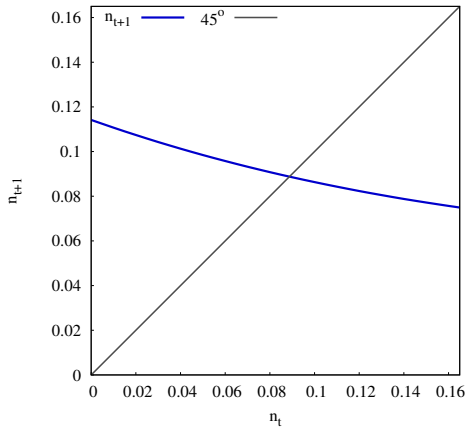
family specific human capital is "more complementary" to entrepreneurial human capital, augmenting the impact that the former has on the latter. This increases - *ceteris paribus* - the mass of firms' heirs continuing the family business both at the bottom and at the top of the ability distribution (formally, increasing a^{ϕ} and reducing a^{F}). While this effect tends to increase the growth rate, it also sufficiently heightens, via the general equilibrium channel, the selection effect (i.e., formally increasing a^{NF}) that the net effect is a lower growth rate.

D.1.2 Dynamics

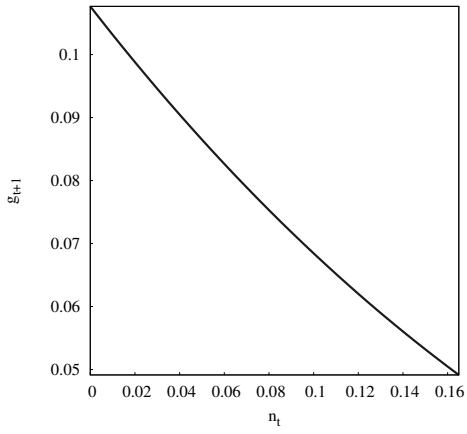
As in Appendix C.1, given α, ϕ and an initial condition n_0, the dynamics toward the steady state is identified by the sequence of intra-temporal equilibria characterized by the ability thresholds (i.e., wage rate) clearing the labor market, and the inter-temporal equilibrium is obtained by iterating over time using the dynamic equation of the number of firms in (D.8).

The dynamic adjustment of the economy features oscillations around the steady state equilibrium rather than a monotonic convergence towards it as in the basic model. In particular, if ϕ is sufficiently

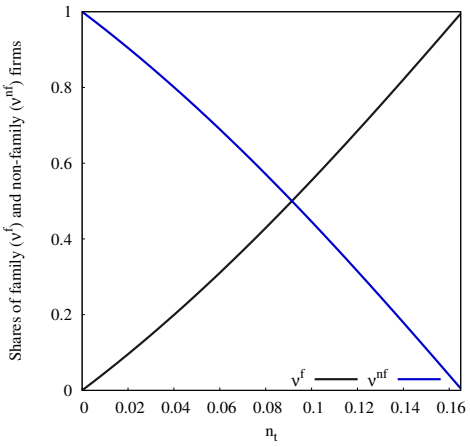
Figure D.3: Simulations of the dynamic process ($\alpha = 0.25, \sigma = 1.4, \phi = 0.01$)



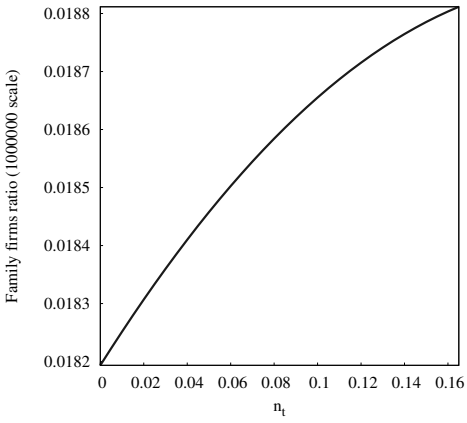
(a) Dynamic equation of n_{t+1}



(b) Growth transition of g_{t+1} as function of n_t



(c) Shares of family and non-family firms



(d) Family firms ratio (ρ_{t+1})

low,[8] the dynamic process is characterized by oscillatory convergence of the state variable n_t to its unique globally stable steady-state value, as panel D.3(a) illustrates for the case of $\alpha = 0.25$, $\sigma = 1.4$ and $\phi = 0.01$. As the other variables adjust accordingly, also the growth rate (panel D.3(b)), the shares of family and non-family firms (panel D.3(c)), and the quality of family firms (panel D.3(d)) converge in oscillations to their unique globally stable steady state. By contrast, if ϕ is large, the steady state becomes globally unstable as the oscillations become sufficiently large (i.e., $|n'_{t+1}(n_t)| > 1$) that either the state variable n_t is at its steady state or it diverges from it.

D.2 Unitary elasticity

In this section, we consider the robustness of the basic model to the more extreme assumption that the elasticity of substitution between managerial inputs tends to one. For $\sigma \to 1$, the managerial capital in (D.1) converges at the limit to infinity, while the closer finite approximation for managerial

[8] Numerically, it is possible to compute a $\hat{\phi} \in (0, \bar{\phi})$ (see footnote 7) such that for any $\phi < \hat{\phi}$, $|n'_{t+1}(n_t)| < 1$, $\forall n_t$.

capital assumes the multiplicative form

$$m_{t+1}^i = \left(\tau_t^i \, a_{t+1}^i\right) \left[\left(1-\tau_t^i\right) \phi \, (1-g_{t+1})\right]^\iota . \tag{D.12}$$

From equation (D.3), entrepreneurs' descendants divide their time equally between the acquisition of entrepreneurial and family specific human capital ($\tau^i = 1/2$), independent of their innate ability. For workers' descendants, instead, conditional on choosing to found a new enterprise, the time investment is still $\tau^i = 1$ as in the basic model. Hence, the optimal managerial capital is:

$$m_{t+1}^i = (\phi(1-g_{t+1})/4)^\iota \; a_{t+1}^i. \tag{D.13}$$

Since the family specific human capital does not enter into the managerial capital function of workers' descendants, their occupational choices remain unchanged, such that descendants with an innate ability greater than a_{t+1}^{NF} in (D.2) become entrepreneurs; otherwise they work for a wage. However, due to the unitary elasticity of substitution, the family specific human capital does not provide an income insurance to entrepreneurs' heirs anymore, while they only affect the marginal productivity of the entrepreneurial human capital of family entrepreneurs. Therefore, the occupational choices of parent entrepreneurs are governed only by the upper ability threshold a_{t+1}^F, which is obtained by substituting (D.13) in (D.5) as

$$a_{t+1}^F = \left(\frac{w_{t+1}}{\pi_{t+1} \left(\phi(1-g_{t+1})/4\right)^{\frac{1}{\alpha}}}\right)^{\frac{\alpha}{1-\alpha}} = \frac{a_{t+1}^{NF}}{\left(\phi \, (1-g_{t+1}) \, /4\right)^{\frac{1}{1-\alpha}}}. \tag{D.14}$$

The dynamics of firms is then given by

$$n_{t+1} = n_t(1-a_{t+1}^F) + (1-n_t)(1-a_{t+1}^{NF}), \tag{D.15}$$

such that the equilibrium between firm entry and exit is reached at:

$$n = \frac{1-a^{NF}}{1-a^{NF}+a^F}. \tag{D.16}$$

The labor market equilibrium condition, $H_{t+1}^S = H_{t+1}^D$, is given by:

$$\begin{aligned} \frac{n_t(a_{t+1}^F)^2 + (1-n_t)(a_{t+1}^{NF})^2}{2} = \left[\frac{(1-\alpha)}{(1+\alpha)(a_{t+1}^{NF})^{\frac{1-\alpha}{\alpha}}}\right] \Big[& n_t \left(\phi \, (1-g_{t+1}) \, /4\right)^{\frac{1}{\alpha}} \left(1-(a_{t+1}^F)^{\frac{1+\alpha}{\alpha}}\right) + \\ & + (1-n_t)\left(1-(a_{t+1}^{NF})^{\frac{1+\alpha}{\alpha}}\right)\Big], \end{aligned} \tag{D.17}$$

which, using (D.14), can be solved for the unique threshold a_{t+1}^{NF} (i.e., wage rate from (D.2)) that clears the labor market

$$a_{t+1}^{NF} = \left[\frac{2(1-\alpha)\left(1-n_t+n_t\left(\phi \, (1-g_{t+1}) \, /4\right)^{\frac{1}{\alpha}}\right)}{(3-\alpha)\left(1-n_t+n_t\left(\phi \, (1-g_{t+1}) \, /4\right)^{-\frac{2}{1-\alpha}}\right)}\right]^{\frac{\alpha}{1+\alpha}}. \tag{D.18}$$

Assuming again that the growth rate of aggregate technology depends on total entrepreneurial

human capital in the economy, and recalling that $\tau^i_{|\iota=1} = 0.5$ and $\tau^i_{|\iota=0} = 1$, we have:

$$g_{t+1} = \frac{n_t}{2} \int_{a^F_{t+1}}^{1} a^i_{t+1} \, \mathrm{d}a^i_{t+1} + (1 - n_t) \int_{a^{NF}_{t+1}}^{1} a^i_{t+1} \, \mathrm{d}a^i_{t+1} = \frac{n_t \left[1 - (a^F_{t+1})^2\right] + 2(1 - n_t) \left[1 - (a^{NF}_{t+1})^2\right]}{4}. \quad \text{(D.19)}$$

D.2.1 Steady state

As usual, we focus on the existence of steady states characterized by a positive turnover of firms in the industry and social mobility. As we stated above, when $\sigma \to 1$, the family specific human capital loses its insurance role, while they keep the role of supporting the productivity of the entrepreneurial human capital of family entrepreneurs. Family name and contacts are an "asset" for entrepreneurs' descendants only if ϕ is sufficiently high, such that $\phi(1 - g_{t+1})/4 > 1$, where 1 indicates the marginal productivity of the entrepreneurial human capital of workers' descendants (see equation (D.13)). In this case, the marginal descendant continuing the family business has a lower innate ability than the marginal new entrepreneur ($a^F < a^{NF}$; see panel D.4(b)). Otherwise, if $\phi(1 - g_{t+1})/4 < 1$, family name and contacts would act as a "liability" on the productivity of entrepreneurial human capital of family entrepreneurs, making it systematically lower than that of workers' descendants, such that $a^F > a^{NF}$.

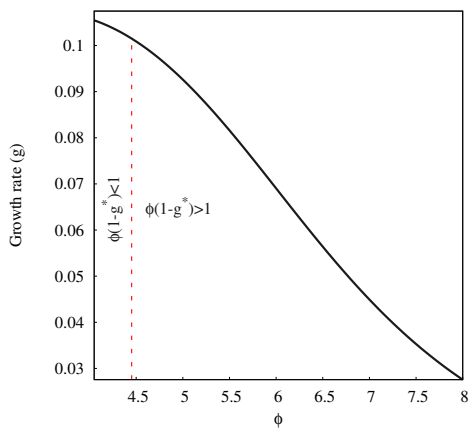
Steady state simulations for $\alpha = 0.25$ are shown in Figure D.4, where the main variables are plotted against ϕ (as usual, results are robust to changes in the span of control parameter α).

The negative association between the steady state growth rate and the productivity of the family specific human capital (panel (a)) is still driven by the selection and education effects of ϕ on the total amount of entrepreneurial human capital employed by firms. As in Section D.1.1, the increase in productivity of the family specific human capital reduces the mass of individuals at the top of the ability distribution entering the entrepreneurial sector and thus the share of non-family firms in the economy (panels (b) and (d)), and reduces the time investment of entrepreneurs' descendants in entrepreneurial human capital. Since entrepreneurs' descendants do not invest in entrepreneurial human capital as much as workers' descendants, the selection effect is stronger than the positive scale effect of ϕ on g produced by the greater number of entrepreneurs continuing the firm within the family.

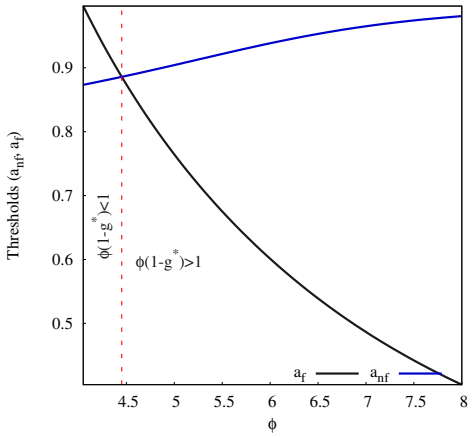
D.2.2 Dynamics

Figure D.5 shows the dynamic adjustment towards the steady state when $\sigma \to 1$ and $\phi = 6$ and $\alpha = 0.25$ (results are robust to changes in ϕ and α). Again, variables follow an oscillatory path that may or may not converge to the unique steady state according to whether or not ϕ is sufficiently low.

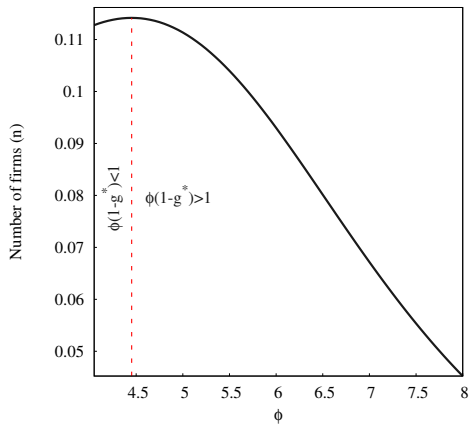
Figure D.4: Simulations ($\alpha = 0.25$)



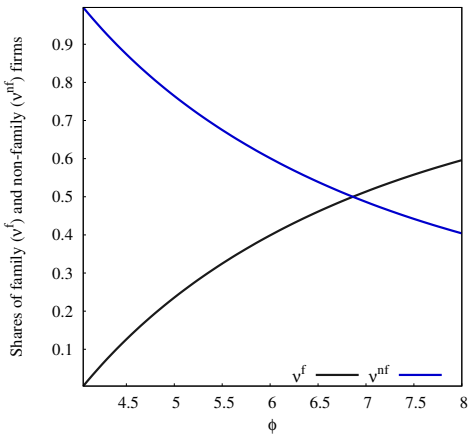
(a) g^*



(b) Thresholds

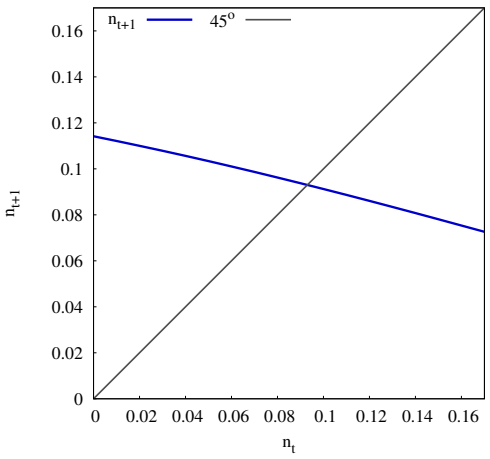


(c) n^*

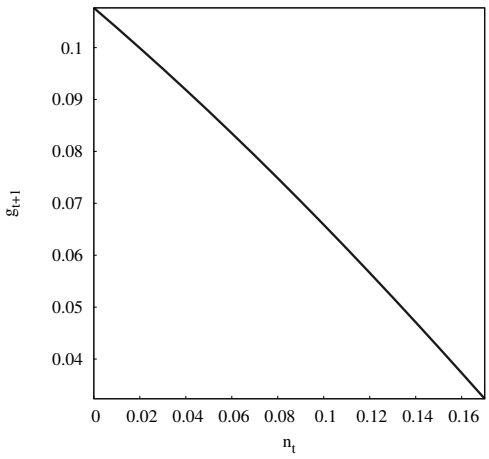


(d) Shares of family and non-family firms

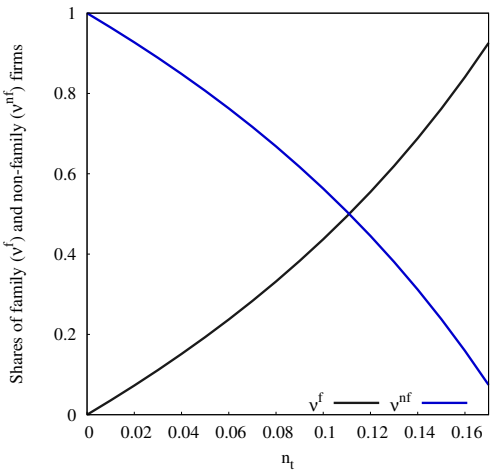
Figure D.5: Simulations of the dynamical process ($\alpha = 0.25, \phi = 6$)



(a) Dynamic equation of n_{t+1}



(b) Growth transition of g_{t+1} as function of n_t



(c) Shares of family and non-family firms

Appendix E. Capital markets and monetary bequest

Throughout the paper, we have abstracted from the existence of capital markets and the possibility that parents can shape the occupational choices of their descendants transferring them also a monetary bequest.

In this Appendix, we introduce these features by slightly redesigning the optimization problem and allowing parents to bequeath a monetary amount to their descendants. Then, differently from Section 3 in the paper, we assume that workers' descendants willing to start an entrepreneurial career must pay for the business license in advance by using possible monetary bequests left by parents and raising money in the capital market. Otherwise, descendants (both of workers and entrepreneurs) can lend the bequest received on the markets.

Capital markets provide workers' descendants with financial resources to pay the cost of the license whenever the bequest received is lower than the cost of the business license. If capital markets are perfect (i.e., if people can supply and demand funds at the same interest rates), the initial distribution of parental wealth, while influencing the wealth distribution of the descendants through the monetary bequest, does not affect the parents' occupational choices and, as a consequence, has no effect on the aggregate equilibrium (Section 3). By contrast, if capital markets are imperfect, the initial wealth of parent workers shapes descendants' careers, introducing a source of misallocation that exacerbate the misallocation induced by the family specific human capital. Therefore, in what follows we focus on this latter case, assuming that there exists a wedge between borrowing (R_B) and lending (R_L) interest rates, $R_B - R_L > 0$, such that the larger the wedge the stronger the frictions in the capital market.

E.1 Optimization and occupational choices

Parent entrepreneurs Since the only capital expenditure is the acquisition of a business license, capital market imperfections do not affect the occupational and bequest choices of parent entrepreneurs with respect to the case of no capital markets.

Formally, assuming that parent entrepreneurs can transfer to their heirs a monetary bequest, their optimization problem becomes

$$\max_{b_t^{i,e}} u_t^{i,e} = \gamma \ln c_t^i + (1-\gamma) \ln \left[I_{z,t+1}^i + R_L \, b_t^{i,e} \right] \quad s.t. \quad \Omega_t^i = c_t^i + b_t^{i,e}, \tag{E.1}$$

where $b_t^{i,e}$ is the monetary bequest, capitalized at the lending rate R_L, Ω_t^i is the parental wealth and $z = \{e, \omega\}$ is the occupation of the descendant, entrepreneur (e) or worker (ω). Whatever the career chosen for the heirs, the optimal amount of bequest is:

$$\left(b_t^{i,e} \right)^* = (1-\gamma)\Omega_t^i - \frac{\gamma}{R_L} I_{z,t+1}^i \tag{E.2}$$

and the indirect utility of parents is:

$$v_{z,t}^{i,e} = \eta + \ln[R_L \, \Omega_t^i + I_{z,t+1}^i], \tag{E.3}$$

where $\eta = \gamma \ln \gamma + (1-\gamma)\ln(1-\gamma)$. Parents choose whether or not to continue the firm within the family depending on whether their indirect utility in the case of the firm's sale is lower or higher than that in the case of continuation. If parents choose to sell the firm, their wealth is $\Omega_t^i = \pi_t^i + R_L b_{t-1}^i + p$, where b_{t-1}^i is the bequest they received when young from their grandparents and p is the proceeds of the sale, while the descendant's non-inherited income is $I_{\omega,t+1}^i = w_{t+1}^i$. If, instead, parents choose to continue the firm within the family, their wealth is $\Omega_t^i = \pi_t^i + R_L b_{t-1}^i$ while their descendants' non-inherited income is $I_{e,t+1}^i = \pi_{t+1}^i$. It is easy to show that the optimal occupational choices remain qualitatively the same as those derived in the setting without capital markets (Section 3), and the steady-state thresholds a^ϕ and a^a characterizing these choices are:

$$a^\phi = \frac{\pi\left(\phi(1-g^*)\right)^{1/\alpha} - R_L\, p}{w}, \tag{E.4}$$

$$\pi\left(a^a\right)^{1/\alpha} = w a^a + R_L\, p. \tag{E.5}$$

By comparing thresholds (E.4) and (E.5) with (26) and (27), the results without capital markets in Section 3 can then be interpreted as a parameterization of a model with credit markets setting $R_L = 1$.

Parent workers To characterize the occupational choices of parent workers, we need to distinguish between *wealth-unconstrained* and *wealth-constrained* generations $t+1$. The former are workers' descendants who receive from parents a bequest greater than the price of the license so to be also net lenders on the capital markets at the lending rate R_L; the latter are those who receive a bequest which is lower than the license price and close the finance gap by raising resources in the capital market at the borrowing rate R_B.

In this setting, the general optimization problem is:

$$\begin{aligned} \max_{b_{r,t}^{i,\omega}} u_t^{i,\omega} &= \gamma \ln c_t^i + (1-\gamma)\ln\left[I_{z,t+1}^i - R_r\left(p - b_{r,t}^{i,\omega}\right)\right] \\ s.t. \quad \Omega_t^i &= c_t^i + b_{r,t}^{i,\omega}, \end{aligned} \tag{E.6}$$

where Ω_t^i is the wealth of parent workers and $b_{r,t}^{i,\omega}$ the monetary bequest they choose to leave to their descendants, with $r = \{B, L\}$ depending on whether the optimal bequest is greater or lower than the firms' price such that the descendants need to resort to the capital markets to borrow or have the possibility to lend the excess bequest they receive. Whenever parents choose an entrepreneurial career for their descendants (i.e., $I_{t+1}^i = \pi_{t+1}^i$) they take into account the gap between the bequest they leave and the price their descendants would pay to buy the license, considering also the difference in the interest rates that the descendants will face on by borrowing (R_B) or lending (R_L).

The optimal bequest is

$$\left(b_{r,t}^{i,\omega}\right)^* = (1-\gamma)\Omega_t^i - \frac{\gamma}{R_r}(I_{z,t+1}^i - R_r\, p) \tag{E.7}$$

It depends negatively on the perspective labor incomes, and hence on the innate abilities of the descendants, while it is a positive function of the license's price, interest rates and parental wealth. This latter is given by

$$\Omega_t^i = w_t a_t^i + R_L\, b_{t-1}^i, \tag{E.8}$$

where $w_t a_t^i$ is the parents' wage income, and b_{t-1}^i the bequest parents' workers received in their

childhood, accumulated at the lending rate R_L. Substituting b^i_{t-1} in the wealth of parent workers with the optimal bequest of their grandparents $(b^i_{t-1})^* = (1-\gamma)\Omega^i_{t-1} - (\gamma/R_L)w_t a^i_t$, the wealth of the parent workers can then be rewritten as

$$\Omega^i_t = (1-\gamma)\left(w_t a^i_t + R_L\,\Omega^i_{t-1}\right). \tag{E.9}$$

Equation (E.9) indicates that the dynamics of wealth of each dynasty is governed by a first order difference equation with a random shift, determined by the periodic draw of the innate abilities from the support of the distribution. Since we are primarily interested in showing the consistence of our main results to the introduction of capital markets, we focus on particular configurations of the wealth distribution compatible with steady states with positive entry and exit from the firm market. At this end, we simplify the analysis, restricting our attention to the invariant limiting distribution of wealth for each dynasty. Formally, if $R_L < 1/(1-\gamma)$,[9], the long-run wealth of parent workers is governed only by their own innate ability

$$\hat{\Omega}^i_t = \xi w_t a^i_t, \tag{E.10}$$

where $\xi = [(1-\gamma)/(1-(1-\gamma)R_L)]$. Therefore, we assume:

Assumption E.1. $\forall\, t$, $\Omega^i_t = \hat{\Omega}^i_t$.

Using eq. (E.7), the indirect utility of parent workers is given by

$$v^{i,\omega}_{z,r,t} = \eta - \gamma \ln R_r + \ln[R_r\,\Omega^i_t + I^i_{z,t+1} - R_r\,p]. \tag{E.11}$$

The final occupational choices can be obtained by comparing the indirect utilities of parent workers under the two career options (i.e., entrepreneurship or employment) conditional on the two possible initial conditions of parental wealth, which determine the constrained and unconstrained generations. If the descendants will become workers, $I^i_{z,t+1} = w^i_{t+1}$, $p = 0$ and $R_r = R_L$, since in this case the descendants are net lenders of any positive bequest they receive. If the descendants will become entrepreneurs, $I^i_{z,t+1} = \pi^i_{t+1}$, $p > 0$, and $R_r = \{R_L, R_B\}$ according to whether $(b^{i,\omega}_{L,t})^* \geq p$ and the descendants are net lenders on the capital markets, or $(b^{i,\omega}_{B,t})^* < p$ and the descendants are net borrowers.

As without capital markets, for the wealth-unconstrained generations $t+1$ the occupational choice depends only on the ability threshold a^a that is implicitly defined by eq. (E.5), such that workers' descendants with ability $a^i_{t+1} \geq a^a$ are directed to an entrepreneurial career, otherwise they they are directed to a wage-earning career. For wealth-constrained generations $t+1$, parent workers have to choose for their descendants between a career as an entrepreneur by bequeathing the amount $(b^{i,\omega}_{B,t})^* < p$, and a wage-earning career by bequeathing the amount $(b^{i,\omega}_{L,t})^*$. Formally, parent workers choose for their descendants the entrepreneurial career if

$$\eta - \gamma \ln R_B + \ln[R_B\,\Omega^i_t + \pi^i_{t+1} - R_B\,p] \geq \eta - \gamma \ln R_L + \ln[R_L\Omega^i_t + w^i_{t+1}] \tag{E.12}$$

Substituting $\hat{\Omega}^i_t$ from (E.10) for Ω^i_t and rearranging, parent workers prefer for their descendants the

[9]This assumption implies that in the long run the wealth of each dynasty does not converge to infinity regardless of the ability of the first generation such that a limiting distribution exists and is a one-to-one map of ability distribution.

entrepreneurial career as long as:

$$a_t^i \geq \frac{1}{\Delta_R \xi w_t}\left[\frac{w_{t+1}a_{t+1}^i}{R_L^\gamma} - \frac{\pi_{t+1}(a_{t+1}^i)^{1/\alpha} - R_B p}{R_B^\gamma}\right] \equiv \mathcal{F}(a_{t+1}^i) \tag{E.13}$$

where $\Delta_R = R_B^{1-\gamma} - R_L^{1-\gamma}$, $\mathcal{F}(0) = R_B^{1-\gamma} p/\Delta_R \xi w_t > 0$, and $\mathcal{F}(.)' \gtreqless 0$ for $a_{t+1}^i \lesseqgtr [(R_B/R_L)^\gamma (\alpha\, w_{t+1}/\pi_{t+1})]^{\alpha/1-\alpha}$.

In order to be admissible, the optimal occupational choices must be consistent with the bequest constraint. Hence, for unconstrained generations $(b_{L,t}^{i,\omega})^* \geq p$ must hold, while for the constrained ones $(b_{B,t}^{i,\omega})^* < p$. Substituting $I_{z,t+1}^i = \pi_{t+1}^i$ and $\hat{\Omega}_t^i = \Omega_t^i$ in the optimal bequest (E.7), the locus of parent and child abilities (a_t^i, a_{t+1}^i) for which $(b_{r,t}^{i,\omega})^* = p$ is given by

$$a_t^i = \frac{1}{\xi w_t}\left[p + \frac{\gamma\, \pi_{t+1}(a_{t+1}^i)^{1/\alpha}}{(1-\gamma)R_r}\right] \equiv \mathcal{B}_\mathcal{R}(a_{t+1}^i; R_r) \tag{E.14}$$

such that

$$\left(b_{r,t}^{i,\omega}\right)^* \begin{cases} \geq p & \text{if } a_t^i \geq \mathcal{B}_\mathcal{R}(a_{t+1}^i; R_r) \\ < p & \text{otherwise,} \end{cases} \tag{E.15}$$

with $\mathcal{B}_\mathcal{R}(0) = p/\xi w_t < \mathcal{F}(0)$ and $\mathcal{B}_\mathcal{R}(.)' > 0$.

Let $\mathcal{B}_\mathcal{L}(a_{t+1}^i) \equiv \mathcal{B}_\mathcal{R}(a_{t+1}^i; R_L)$ and $\mathcal{B}_\mathcal{B}(a_{t+1}^i) \equiv \mathcal{B}_\mathcal{R}(a_{t+1}^i; R_B)$ be the two bequest loci for unconstrained and constrained generations, the whole occupational choice schedule of parent workers is the following

Proposition E.1. *Under imperfect capital markets, the choices of parent workers are such that:*

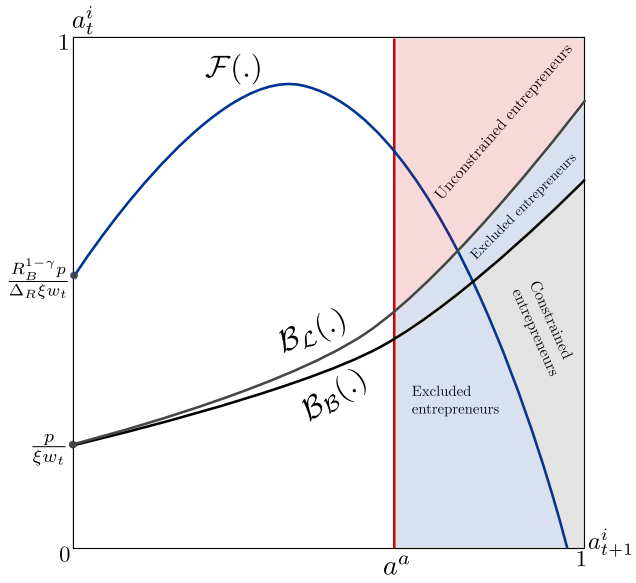
1. *for any pair (a_t^i, a_{t+1}^i) such that $a_{t+1}^i \geq a^a$ and $a_t^i \geq \mathcal{B}_\mathcal{L}(a_{t+1}^i)$, workers' descendants undertake the entrepreneurial career by inheriting a bequest greater than the price of the business license and investing the difference in the capital market;*

2. *for any pair (a_t^i, a_{t+1}^i) such that $\mathcal{F}(a_{t+1}^i) < a_t^i < \mathcal{B}_\mathcal{B}(a_{t+1}^i)$, workers' descendants undertake the entrepreneurial career by inheriting a bequest lower than the price of the business license and borrowing the difference in the capital market;*

3. *otherwise, workers' descendants undertake the wage-earning career.*

Figure E.1 shows the occupational choices described in Proposition E.1. By forcing new potential entrepreneurs who are wealth-constrained to borrow at a "penalty" rate, capital market imperfections discourage the entry of some highly talented individuals in the industry and reduce social mobility. In particular, Proposition E.1 highlights that parent workers who never choose for their descendants an entrepreneurial career when capital markets are either perfectly operating or not active at all continue not to opt for the entrepreneurial sector also when these markets are incomplete (i.e., all parents of agents with ability lower than a^a). Among those who would have chosen an entrepreneurial career, the occupational choices remain qualitatively unchanged only for the wealth-unconstrained descendants, the *unconstrained entrepreneurs* (i.e. those above the curve $\mathcal{B}_\mathcal{L}(.)$ in the red area). Instead, capital market imperfections block the entry into the entrepreneurial sector to some of the workers' descendants already constrained when capital markets were perfectly functioning, the

Figure E.1: Occupational choices of parent workers with capital market imperfections



excluded entrepreneurs (i.e., those in the blue area in Figure E.1).[10] These are the least talented descendants of low-ability parent workers for whom the financing gap is so large that the wage-earning career is preferable to an entrepreneurial career (the blue area below the $\mathcal{F}(.)$ and $\mathcal{B}_\mathcal{B}(.)$ curves). Similarly, for descendants in the area between the $\mathcal{B}_\mathcal{L}(.)$ and $\mathcal{B}_\mathcal{B}(.)$ curves, the bequest that they receive from parents is not sufficiently large to buy the business license, but it is sufficiently large to ensure, once capitalized at the rate R_L and added to the wage, a total income greater than what can be earned by starting a new enterprise and borrowing the amount $p - (b_{B,t}^{i,\omega})^*$ at the rate R_B.

E.2 Equilibrium and aggregate effects

The general equilibrium is characterized by the wage rate and the price of the license that clear both the markets for labor and firms. Since the hypothesis of capital market imperfections greatly reduces the analytic tractability of the model, we simplify the analysis by assuming that the wage rate is always at its equilibrium level.[11] In this way, we turn off the general equilibrium effects generated by the adjustments arising in the labor market and focus only on the adjustment effects in the market for firms.

From Proposition E.1, for any mass $1 - n$ of parent workers, the share of workers' descendants excluded from the entrepreneurial sector due to capital market frictions is

$$\varepsilon = \int_{a^a}^{1} \mathcal{B}_\mathcal{L}(a_{t+1}^i)\, \mathrm{d}a_{t+1}^i - \int_{a^\dagger}^{1} \left[\mathcal{B}_\mathcal{B}(a_{t+1}^i) - \mathcal{F}(a_{t+1}^i)\right] \mathrm{d}a_{t+1}^i, \tag{E.16}$$

[10] Excluded entrepreneurs are defined as those workers' descendants that would have joined the entrepreneurial sector either in absence of capital markets or in the case of capital markets perfectly operating, but they are not in the case of capital market imperfections. Specifically, in the former cases, all workers' descendants with ability $a_{t+1}^i \geq a^a$ would have joined the entrepreneurial sector. Part of this mass is 'excluded' from the entrepreneurial sector when capital markets are imperfectly operating.

[11] The proofs for the complete general equilibrium are available upon request. In particular, it can be shown that there exists a unique combination of wage and price that clears both the markets for labor and firms and that the general equilibrium effects produced by the labor market reinforce those arising in the market for firms.

where $a^{\dagger} \equiv a^i_{t+1} : \mathcal{B}_{\mathcal{B}}(a^i_{t+1}) = \mathcal{F}(a^i_{t+1})$.[12]

Since capital market frictions do not directly affect the occupational choices of parent entrepreneurs, the supply of business licenses is qualitatively unchanged with respect to the cases of no or perfect capital markets: specifically, $L^S = n(a^a - a^\phi)$, with a^ϕ and a^a given by thresholds in equations (E.4) and (E.5). By contrast, capital market imperfections restrict the demand for licenses by workers' descendants, which is equal to $L^D = (1-n)(1-a^a-\varepsilon)$, where a^a and ε are from equations (E.5) and (E.16). Therefore, the equilibrium in the market for firms is

$$a^a = (1-n)(1-\varepsilon) + n\, a^\phi. \tag{E.17}$$

As the threshold a^a is a one-to-one function of p (see equation (E.5)), we can solve equation (E.17) for a^a and recover the equilibrium price of the business license. Maintaining the assumption that the growth rate is defined by the fraction of firms in the population using entrepreneurial human capital, the growth rate is given by

$$g = n(1-a^a) + (1-n)(1-a^a-\varepsilon) = 1 - a^a - (1-n)\varepsilon. \tag{E.18}$$

Proposition E.2. *A unique price p^* exists such that the market for firms clears. For any $\phi < \overline{\overline{\phi}} < 1$, the equilibrium is characterized by a positive number of business license exchanges. Moreover, there exists a threshold $\underline{\underline{\phi}} < \overline{\overline{\phi}}$ such that:*

(a) for any $\phi \in \left(\underline{\underline{\phi}}, \overline{\overline{\phi}}\right)$, family firms are polarized into badly and well managed enterprises: the former are conducted by the least talented entrepreneurs' descendants, with an innate talent $a^i \leq a^\phi$, continuing the family business by relying on the managerial value of the family specific human capital; the latter are conducted by the most talented descendants, with an innate talent $a^i \geq a^a$, by relying on entrepreneurial human capital. A share $n(a^a - a^\phi)$ of family firms is sold in the market to $(1-n)(1-a^a-\varepsilon)$ workers' descendants who start a new enterprise;

(b) for any $\phi \leq \underline{\underline{\phi}}$, parent entrepreneurs with descendants of innate talent $a^i < a^\phi$ sell the firm in the market, such that all the firms in the economy, both family and non-family, are well managed by using entrepreneurial human capital.

Capital market imperfections tend to strengthen the weight of family firms, especially of those badly managed by low talented heirs, and exacerbate the misallocation effects induced by the managerial value of the family specific human capital.

Proposition E.3. *The stronger the capital market imperfections (Δ_R), (i) the larger the share of family firms and of those managed using family specific human capital; (ii) the lower the overall share of firms managed by entrepreneurial human capital; (iii) the lower the number of firm sales; (iv) the lower the growth rate of aggregate technology.*

By forcing a share of highly talented descendants of workers not to join the entrepreneurial sector, capital market imperfections have direct and indirect detrimental effects in the market for firms, and ultimately on the growth rate of the economy. The reduction in the growth rate produces additional general equilibrium effects. First, it heightens the productivity of the family specific human capital

[12] Using $\mathcal{F}(.)$ from (E.13) and $\mathcal{B}_{\mathcal{B}}(.)$ from (E.14), and given the assumptions $R_B > R_L$ and $R_L < 1/(1-\gamma)$, it results that $a^{\dagger} \equiv a^i_{t+1} : w_{t+1} a^i_{t+1} + R_L\, p = \pi_{t+1}(a^i_{t+1})^{\frac{1}{\alpha}} \hat{\Delta}_R$, where $\hat{\Delta}_R = (R_L)^{\gamma}\left[(R_B)^{1-\gamma} - \gamma\,(R_L)^{1-\gamma}\right]/[(1-\gamma)R_B] < 1$, and $a^{\dagger} > a^a$.

and increases the share of family firms using crony management practices. Second, the adjustments in the market for firms generate a decrease in the share of highly talented descendants managing an enterprise, further depressing the aggregate growth rate. These two effects unambiguously increase the managerial value of the family specific human capital and the share of crony family firms, decreasing the supply of firms' license and rebalancing the market for firms. Finally, it is worth emphasizing the substitution role played by family firms when capital markets work imperfectly. Indeed, in this case the share of highly talented heirs continuing the family firms becomes greater than that of the highly talented workers' descendants starting new enterprises, and the role of family firms in sustaining the aggregate growth rate of the economy becomes stronger.

E.3 Market for managers

The market for managers, if not characterized itself by any further distortions (i.e., moral hazard, asymmetric information), can mitigate and counterbalance the aggregate negative effects of capital market imperfections. When capital markets are imperfect, wealth-constrained workers' descendants have to sustain a higher cost, equal to $R_B\, p$, to obtain a firm's license and a share of them is forced not to join the entrepreneurial sector. If a market for managers opens up, these workers' descendants can access the entrepreneurial sector by being appointed to the helm of family companies as professional managers. Since in equilibrium the dividend paid to entrepreneurs' descendants is equal to the license price, the participation constraint for the wealth-constrained generation is no longer binding and they strictly prefer to supply their entrepreneurial human capital as professional managers rather than buy a license at the penalty cost $R_B\, p$. As a result, the existence of a market for managers can restore the aggregate equilibrium under perfect capital markets.

E.4 Proofs for Appendix E

Proof of Proposition E.1 It derives using equations (E.4)-(E.5) and equations (E.13)-(E.14)-(E.15).

Proof of Proposition E.2 Using eqs. (E.4)-(E.5), a^{ϕ} can be expressed as a function of a^a as

$$a^{\phi} = \frac{\pi(\phi(1-g))^{\frac{1}{\alpha}}}{w} - \left(\frac{\pi(a^a)^{\frac{1}{\alpha}} - wa^a}{w}\right) \tag{E.19}$$

Substituting eqs. (E.18) and (E.19) in eq. (E.17), the equilibrium in the market for firms is given by the threshold a^a that solves the implicit equation

$$P(a^a) = a^a - 1 + \varepsilon^* + \frac{n\pi}{(1-n)w}\left[(a^a)^{\frac{1}{\alpha}} - \phi^{\frac{1}{\alpha}}\left(a^a + (1-n)\varepsilon^*\right)^{\frac{1}{\alpha}}\right] = 0 \tag{E.20}$$

where ε^* is the equilibrium share of excluded entrepreneurs on the balanced growth path, derived as follows. At each time t, the share of excluded entrepreneurs ε in (E.16) is a function of the equilibrium wage rate both at time t and $t+1$, because the occupational choices of the workers' descendants (generation $t+1$) depend on both their prospective wage income w_{t+1}, and on the wealth of their

parent workers which is a function of w_t. Formally, rewrite ε from eq. (E.16) as:

$$\varepsilon = \frac{\int_{a^a}^{1} \tilde{\mathcal{B}}_{\mathcal{L}}(a^i)\,\mathrm{d}a^i - \int_{a^\dagger}^{1} \left[\tilde{\mathcal{B}}_{\mathcal{B}}(a^i) - \tilde{\mathcal{F}}(a^i)\right]\,\mathrm{d}a^i}{\xi w_t} \tag{E.21}$$

where $[\tilde{\mathcal{B}}_{\mathcal{L}}, \tilde{\mathcal{B}}_{\mathcal{B}}, \tilde{\mathcal{F}}] = \xi w_t [\mathcal{B}_{\mathcal{L}}, \mathcal{B}_{\mathcal{B}}, \mathcal{F}]$ are the loci in (E.13) and (E.14) on the balanced growth path. Since $w_t = w_{t+1}/(1+g)$ holds on the balanced growth path, using (E.18):

$$\varepsilon^* = \frac{(2-a^a)\tilde{\varepsilon}}{\xi w + (1-n)\tilde{\varepsilon}} \tag{E.22}$$

where, to simplify notation, $\tilde{\varepsilon} = \int_{a^a}^{1} \tilde{\mathcal{B}}_{\mathcal{L}}(a^i)\,\mathrm{d}a^i - \int_{a^\dagger}^{1} \left[\tilde{\mathcal{B}}_{\mathcal{B}}(a^i) - \tilde{\mathcal{F}}(a^i)\right]\,\mathrm{d}a^i$, and w is the equilibrium wage on the balanced growth path.

The existence of a unique threshold a^a, and hence a unique price p^* that clears the market for firms derives from equation (E.20), by noting that $P(0) < 0$ and that

$$\frac{\partial P(a^a)}{\partial a^a} = 1 + \frac{\partial \varepsilon^*}{\partial a^a} + \frac{n\pi}{(1-n)\alpha w}\left[(a^a)^{\frac{1}{\alpha}-1} - \phi^{\frac{1}{\alpha}}\left(a^a + (1-n)\varepsilon^*\right)^{\frac{1}{\alpha}-1}\left(1 + (1-n)\frac{\partial \varepsilon^*}{\partial a^a}\right)\right] > 0 \tag{E.23}$$

since

$$\frac{\partial \varepsilon^*}{\partial a^a} = -\frac{\left[(\xi w + (1-n)\tilde{\varepsilon})\,\tilde{\varepsilon} + \xi w(2-a^a)\tilde{\mathcal{U}}(a^a)\right]}{(\xi w + (1-n)\tilde{\varepsilon})^2} \in (-1, 0) \tag{E.24}$$

and, whenever it exists, $a^a > \phi(1-g) = \phi\left(a^a + (1-n)\varepsilon^*\right)$ as we are focusing on equilibria with positive exchanges of licenses for which $0 \leq a^\phi < \phi(1-g) < a^a < 1$ must hold. Formally, we first note that $a^a < 1$ always holds since $P(1) = \frac{n\pi(1-\phi^{\frac{1}{\alpha}})}{(1-n)w} > 0$ derives from using $\varepsilon^*(a^a = 1) = 0$. Further, there exists a $\overline{\overline{\phi}} < 1$ implicitly defined by $\overline{\overline{\phi}} = a^a / \left(a^a + (1-n)\varepsilon^*\right)$, with an a^a solution of (E.20), such that for any $\phi < \overline{\overline{\phi}}$, $a^\phi < \phi(1-g) < a^a$ is verified.

Finally, we can characterize the equilibrium as in the basic model depending on the productivity of the the family specific human capital. In particular, it exists a $\underline{\underline{\phi}} < \overline{\overline{\phi}}$, with $\underline{\underline{\phi}}$ implicitly defined by $a^\phi = 0$ from eq. (E.19), such that for any $\phi > \underline{\underline{\phi}}$ the equilibrium is characterized by the polarization in the managerial talent of family firms; otherwise, for any $\phi \leq \underline{\underline{\phi}}$ parent owners of least talented heirs choose to sell also the na^ϕ family firms in the market.

Proof of Proposition E.3 Let us start by proving that the erosion effect $1-g$ is increasing in the borrowing rate R_B, while keeping the lending rate R_L constant such that the spread between the two increases. Formally, from equations (E.18) and (E.22) it follows that $1-g = a^a + (1-n)\varepsilon^*$. Hence,

$$\frac{\mathrm{d}(1-g)}{\mathrm{d}R_B} = \frac{\xi w\left[\frac{\mathrm{d}a^a}{\mathrm{d}R_B}\left(\xi w + (1-n)\tilde{\varepsilon}\right) + (1-n)(2-a^a)\frac{\mathrm{d}\tilde{\varepsilon}}{\mathrm{d}R_B}\right]}{(\xi w + (1-n)\tilde{\varepsilon})^2}. \tag{E.25}$$

Using eq. (E.20),

$$\frac{\mathrm{d}a^a}{\mathrm{d}R_B} = -\frac{\partial P(a^a)/\partial R_B}{\partial P(a^a)/\partial a^a}, \tag{E.26}$$

with $\partial P(a^a)/\partial a^a$ given in (E.23) and

$$\frac{\partial P(a^a)}{\partial R_B} = -\frac{\xi w(2-a^a)}{(\xi w+(1-n)\tilde{\varepsilon})^2}\left[1-\frac{n\pi\phi^{\frac{1}{\alpha}}}{\alpha w}(a^a+(1-n)\varepsilon^*)^{\frac{1}{\alpha}-1}\right]\int_{a^\dagger}^{1}\frac{\partial\Lambda(a^i)}{\partial R_B}\,\mathrm{d}a^i, \tag{E.27}$$

where $\Lambda(a^i)=\tilde{\mathcal{B}}_{\mathcal{B}}(a^i)-\tilde{\mathcal{F}}(a^i)$, $\partial\Lambda(a^i)/\partial R_B<0$ and $\Lambda(a^\dagger)=0$ by construction.

Further, using $\tilde{\varepsilon}=\int_{a^a}^{1}\tilde{\mathcal{B}}_{\mathcal{L}}(a^i)\,\mathrm{d}a^i-\int_{a^\dagger}^{1}\Lambda(a^i)\,\mathrm{d}a^i$

$$\frac{\mathrm{d}\tilde{\varepsilon}}{\mathrm{d}R_B} = -\tilde{\mathcal{B}}_{\mathcal{L}}(a^a)\frac{\mathrm{d}a^a}{\mathrm{d}R_B}-\int_{a^\dagger}^{1}\frac{\partial\Lambda(a^i)}{\partial R_B}\,\mathrm{d}a^i \tag{E.28}$$

Finally, substituting (E.26) and (E.28) in (E.25) and rearranging using also (E.24), it results that:

$$\frac{\mathrm{d}(1-g)}{\mathrm{d}R_B}>0 \quad \text{if} \quad 1-\frac{\pi(a^a)^{\frac{1}{\alpha}-1}}{\alpha w}<0$$

which is always verified since, from the definition of a^a in eq. (E.5), for any positive equilibrium price $a^a>(w/\pi)^{\alpha/(1-\alpha)}$.

Clearly, since the erosion effect $1-g$ is increasing in the degree of capital market imperfections (i.e., R_B), the growth rate g is inversely correlated with it. Moreover, since $1-g=a^a+(1-n)\varepsilon^*$, from the equilibrium condition in eq. (E.17) it follows that the threshold a^ϕ is also increasing in R_B, which implies that the stronger the capital market imperfections the larger is the share of crony family firms managed through family specific human capital. Observing that for any given a^a the mass of family firms managed through entrepreneurial human capital, $1-a^a$, is always larger than the mass of non-family firms, $1-a^a-\varepsilon^*$, it also follows that the overall share of family firms $\nu^f=a^\phi+1-a^a$ is increasing while that of non-family firms, $\nu^{nf}=((1-n)/n)(1-a^a-\varepsilon^*)$, is decreasing in the degree of capital market imperfections. Formally, to prove that the share of non-family (resp., family) firms is decreasing (resp., increasing) in R_B, it suffices to check that

$$\frac{\mathrm{d}(a^a+\varepsilon^*)}{\mathrm{d}R_B}=\frac{\frac{\mathrm{d}a^a}{\mathrm{d}R_B}(\xi w+(1-n)\tilde{\varepsilon})(\xi w-n\tilde{\varepsilon})+\xi w(2-a^a)\frac{\mathrm{d}\tilde{\varepsilon}}{\mathrm{d}R_B}}{(\xi w+(1-n)\tilde{\varepsilon})^2}>0, \tag{E.29}$$

which is always verified after using eqs. (E.26) and (E.28).

Appendix F. Data and additional empirical results

F.1 Data source

F.1.1 Firm level variables: World Management Survey (WMS)

Management and ownership data are from the World Management Survey (WMS) by Nicholas Bloom, Raffaella Sadun and John Van Reenen. The survey covers over 10,000 manufacturing firms, operating in different industrial sectors, across 21 countries over the period from 2001 to 2012. For details, see Bloom and Van Reenen (2007).

Management quality The quality of management practices (*Management*) is measured by averaging the interview-based evaluations of 18 specific management practices employed by the firms, covering three key areas of business organization: performance monitoring, targets and incentives. Questions on monitoring try to capture "how well organizations monitor what goes on inside the firm, and use this information for continuous improvement". Questions on targets focus on how "organizations set the right targets, track the right outcomes, and take appropriate action if the two are inconsistent". Finally, questions on incentives map whether "organizations promote and reward employees based on performance, and try to keep their best employees". To each managerial practice a score is assigned from 1 ("worst practice") to 5 ("best practice") and *Management quality* is the firm average of each individual question score.

Family firm Dummy equal to one if the firm is a family firm type. Family firms are identified as those firms in which the descendants in the second generation or beyond from the founder are the largest shareholders with at least 25% of equity. In the non-family-firm category, we include all the types of private firms, while excluding government companies. The non-family firm category includes public firms owned by the founder, firms owned by managers or private individuals, firms with dispersed shareholders, and firms owned by private equity.

Family CEO Dummy equal to one if the family firm is managed by a family member CEO.

External CEO Dummy equal to one if the family firm is managed by a CEO external to the family.

Firm size Ln (Number of firm employees). Interviewee's answer to question "How many people are in the firm?"

Education (managers) Ln (1+% of managers with a college degree). Interviewee's answer to question "What percentage of managers have a college degree?'. This question refers to 3/4-year equivalent college degrees."

Education (non-managers) Ln (1+% of non-managers with a college degree). Interviewee's answer to question "What percentage of non-managers have a college degree?'. This question refers to 3/4-year equivalent college degrees."

Multinational Dummy equal to one if the firm is owned by a multinational. A firm is owned by a multinational when 1) the firm itself owns production sites in a foreign country, 2) when at least 25% of the company belongs to a multinational industrial group (i.e. a group with production sites abroad). In this case the firm would be a subsidiary of a foreign MNE, or 3) when the firm is a joint venture between multinationals of two or more countries.

Managers left Ln (1+ % managers who left the firm in the 12 months before the interview). Interviewee's answer to question "What percentage of managers have left in the last 12 months?".

Noise controls Interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies.

F.1.2 Country variables

Individualism is the index of individualism proposed by the Dutch anthropologist Geert Hofstede (Hofstede et al., 2010). *Individualism* combines responses to 14 questions from a survey about work goals initially conducted between 1969 and 1971 by interviewing over 100,000 employees of IBM International working in subsidiaries in 40 countries and then extended over the years to 40 other countries through replications and extensions of the IBM survey on different international populations like commercial airline pilots. *Individualism* ranges from 0 (strongly collectivistic) to 100 (strongly individualistic) and amounts to the first factor score from the factor analysis of the countries mean scores for the 14 survey questions. Source: Hofstede et al. (2010); data are publicly available at `http://geerthofstede.com/research-and-vsm/dimension-data-matrix/`.

Freedom of choice Freedom of choice and control measures the degree that the individual experiences a freedom of choice and a sense of control of one's life. It is computed as the country average of the individuals' answer to question A173 in the World Value Survey 1981-2014: "Some people feel they have completely free choice and control over their lives, while other people feel that what we do has no real effect on what happens to them. Please use this scale (from 1 to 10) where 1 means "none at all" and 10 means "a great deal" to indicate how much freedom of choice and control in life you have over the way your life turns out."

Family Ties (unimportance) measures the strength of family ties and captures beliefs regarding the importance of the family in the respondent's life, the duties and responsibilities of parents and children, and the love and respect for one's own parents (Alesina and Giuliano, 2014). It is measured by extracting the first principal component from three variables of the 1981-2014 waves of the *World Values Survey*. Higher values mean lower importance of family ties. The first question assesses how important the family is in a person's life and can take values from 1 to 4 (with 1 being very important and 4 not at all important). The second question asks whether the respondent agrees with one of two statements (taking the values of 1 and 2 respectively): (1) Regardless of what the qualities and faults of one's parents are, one must always love and respect them; (2) One does not have the duty to respect

and love parents who have not earned it. The third question prompts respondents to agree with one of the following statements (again taking the values of 1 or 2 respectively): (1) It is the parents' duty to do their best for their children even at the expense of their own well-being; (2) Parents have a life of their own and should not be asked to sacrifice their own well being for the sake of their children.

Institutional Quality is the first principal component of the 2000-2005 average of the six measures of the World Bank's Worldwide Governance Indicators (Kaufmann et al., 2010), with higher values indicating better functioning institutions.

Corruption is the 2000-2005 average of the Control of Corruption indicator from Worldwide Governance Indicators; it measures the perception of the control of corruption and it ranges between -2.5 and +2.5, with higher values meaning perception of stronger control of corruption and hence, potentially, lower corruption.

Rule of Law is the 2000-2005 average of the Rule of Law indicator from Worldwide Governance Indicators; it reflects the effectiveness of the judiciary and the quality of property rights protection, ranging from -2.5 to +2.5, with higher values indicating better institutions.

Barrier to entry index is the first principal component of the 2004-2005 average of the following measures: Starting business procedure (number), Ln(1+ Starting business time (days)), Ln(1+ Starting business cost (% of income per capita)), Ln(1+ Enforcing contracts time (days)), Ln(1+ Enforcing contracts cost (% claim)), Ln(1+ Paying taxes (number per year)), Ln(1+ Paying taxes time (hours per year)), Ln(1+ Paying taxes time (total tax rate % of profit)). Source: Doing Business (World Bank).

Financial development is the 2000-2005 average of domestic credit to private sector as % of GDP. Source: World Development Indicators.

Year of Industrial Transition (YIT) measures the year in which employment in industry exceeded employment in agriculture. Source: Bentzen et al. (2013).

Not industrialized in t Dummy equal to one if the country in year t has not yet industrialized according to the *YIT* measure.

No Pronoun Drop Dummy equal to one if the rule forbidding first person pronoun drop is operative and zero otherwise. Source: Tabellini (2008).

Generic diversity is "the expected heterozygosity (genetic diversity) of a country's population, predicted by migratory distances from East Africa (i.e., Addis Ababa, Ethiopia) to the year 1500 CE locations of the ancestral populations of the country's component ethnic groups in 2000 CE, as well as by pairwise migratory distances between these ancestral populations". Source: Ashraf and Galor (2013).

Ln (per capita GDP) is the log of the 2000-2005 average real ($PPP) GDP per capita. Source: Penn World Table (PWT) Version 8.0 (Feenstra et al., 2013).

Human capital is the 2000-2005 average of the years of schooling. Source: Barro-Lee v.1.3 (Barro and Lee, 2010).

Capital endowment is the 2000-2005 average of the capital stock per worker. Source: Penn World Table (PWT) Version 8.0 (Feenstra et al., 2013).

Trust is the fraction of individuals within a given country that, from the 1981-2014 waves of the *World Values Survey*, responded with "Most people can be trusted" when answering the survey question "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?".

Ethnic and Linguistic Fractionalization are taken from Alesina et al. (2003) and measure the probability that two randomly-selected individuals in a country's population belong to different ethnic or linguistic groups.

Communitarian Family, Autoritarian Family, Egalitarian nuclear Family, Absolute nuclear Family A set of dummy variables that identifies the structure of the families.

Absolute nuclear is a type of family based on no cohabitation of parents and adult children: children leave their family after their adolescence, form their own family and become independent individuals. There are also no specified rules for inheritance and marriage relationships are exogamous. Anglo-Saxon countries, Holland and Denmark belong to this group.

Egalitarian nuclear is a type of family in which we still observe no cohabitation of parents and adult children, and exogamy, but the independence among generations is weaker than in the previous case. More precise rules on inheritance are in place, based on the principle of equality among siblings. France, Italy, Spain, Portugal, Greece, Romania, Poland, Latin America (apart from Cuba) and Ethiopia belong to this group.

Stem family or authoritarian is a type of family based on cohabitation of parents and adult children. Sons remain in their parents' home and are subject to a vertical hierarchical structure. Rules and social norms are strongly transmitted from one generation to the other. The principle of equality is not recognized in this type of family. Germany, Austria, Sweden, Norway, Czech Republic, Belgium, Luxembourg, Scotland, Ireland, Japan, Korea and Israel belong to this group.

Communitarian is a type of family based on cohabitation, with equality among siblings. Russia, Yugoslavia, Slovakia, Bulgaria, Finland, Hungary, Albania, Baltic republics, Centre of Italy, China, Vietnam, Cuba, Indonesia and India belong to this group. Source: Todd (1983).

Executive constraints The 1960-2000 mean of the index, reported annually as a 7-point categorical variable (from 1 to 7) by the Polity IV data set, quantifying the extent of institutionalized constraints on the decision-making power of chief executives. Source: Ashraf and Galor (2013).

Legal origins A set of dummy variables that identifies the legal origin of the Company Law or Commercial Code of a country. The five legal origin possibilities are: (i) English Common Law, (ii) French Commercial Code, (iii) German Commercial Code, (iv) Scandinavian Commercial Code, and (v) Socialist or Communist Laws. Source: La Porta et al. (1999).

Absolute latitude is the value of the latitude of a country's approximate geodesic centroid, as reported by the CIA's World Factbook. Source: Ashraf and Galor (2013).

F.1.3 Industry sector variables

All variables are classified according to the 2-digit US SIC 1987 system.

R&D intensity is the 2000-2005 average of the R&D expenditures as a percentage of production in the United States. Source: OECD STAN ANBERD database. The original data are classified according to the ISIC system (rev. 3). We convert them to 2-digit US SIC 1987 using the International Concordance table between the Industrial Classifications of the United Nations (ISIC Rev. 3) and the US SIC 1987 systems. The table is available at: https://unstats.un.org/unsd/cr/registry/regot.asp?Lg=1.

Skill intensity is the 2000-2005 average of the ratio of non-production worker to total employment in industry sector s in the United States. Source: NBER-CES Manufacturing Database available at: http://www.nber.org/data/nberces.html.

Capital intensity is the 2000-2005 average of the ratio of total real capital stock to value added in industry sector s in the United States. Source: NBER-CES Manufacturing Database available at: http://www.nber.org/data/nberces.html.

Contract intensity Industry sector intensity in relationship-specific investments, computed as the fraction of intermediate inputs that is not traded in a standardized market. Source: Nunn (2007). The original data are classified according to BEA's 1997 I-O classification system. We convert them in 2-digit US SIC 1987, coverting them into the NAICS97 system, using the concordance table from BEA, and then into the 2-digit US SIC 1987 using the concordance table from NAICS97 to US SIC 1987 from North American Industry Classification System (NAICS).

Intangible intensity Industry sector intensity in intangible assets in the United States. Source: Claessens and Laeven (2003).

External dependence Industry sector dependence on external finance, defined as capital expenditure minus internal funds. Source: De Serres et al. (2006).

Value added is the 2000-2005 average of total value added over total employment in industry s in the United States. Source: NBER-CES Manufacturing Database available at: http://www.nber.org/data/nberces.html.

F.2 Tables

F.2.1 Full specifications

Table F.1: Management Quality and Productivity of Family Specific Human Capital

	Management quality									
	OLS								IV (second stage)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family firm	-0.048*	-0.209***	-0.548**	-0.193***	-0.203***	-0.178***	-0.209***	-0.907***	-0.243***	-0.843***
	(0.023)	(0.056)	(0.217)	(0.062)	(0.055)	(0.054)	(0.056)	(0.233)	(0.064)	(0.269)
Family firm × Individualism		0.003***	0.002***	0.002***	0.002**	0.002**	0.003**	0.003***	0.003***	0.002***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family firm × Freedom of choice			0.051					0.092***		0.087**
			(0.030)					(0.032)		(0.034)
Family firm × Family ties (unimportance)				0.105				0.104		0.109
				(0.092)				(0.075)		(0.071)
Family firm × Institutional quality					0.013			0.039		0.033
					(0.010)			(0.030)		(0.032)
Family firm × Barrier to entry index						-0.010		0.039		0.031
						(0.009)		(0.026)		(0.032)
Family firm × Financial development							0.000	-0.000		-0.000
							(0.000)	(0.000)		(0.000)
Firm size	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Education (managers)	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.253***	0.253***	0.254***	0.253***	0.253***	0.253***	0.253***	0.254***	0.253***	0.255***
	(0.028)	(0.027)	(0.028)	(0.027)	(0.027)	(0.028)	(0.027)	(0.028)	(0.026)	(0.027)
Managers left	0.010**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011***	0.011***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214	8214	8214	8214	8214	8214
Adjusted R^2	0.367	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.153	0.154
Hansen overidentification test (p-value)									0.413	0.544
Kleibergen-Paap F-statistic									36.145	82.720
Anderson-Rubin (p-value)									0.000	0.000

The table reports the full specification of Table 1 including all coefficients. The dependent variable is the quality of management practices. OLS estimates in columns (1)-(8). Second stage results of the instrumental variable estimates in columns (9)-(10), where *Family x Individualism* is instrumented with *Genetic Diversity* from Ashraf and Galor (2013) and *No Pronoun Drop* from Tabellini (2008) interacted with *Family* (see Table F.7 for the first stage estimates). All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the % of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. The Stock-Yogo (2005) 10% critical value for the Kleibergen-Paap F-statistic is 19.93 in both columns (9) and (10). Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.2: Management Quality and Family Specific Human Capital within the family

	Management quality				
	OLS			IV (second stage)	
	(1)	(2)	(3)	(4)	(5)
Family CEO	-0.073***	-0.241***	-1.032***	-0.261***	-0.956***
	(0.024)	(0.066)	(0.254)	(0.067)	(0.300)
External CEO	0.078**	0.026	-0.340	-0.064	-0.412
	(0.030)	(0.065)	(0.345)	(0.081)	(0.342)
Family CEO × Individualism		0.003***	0.003***	0.003***	0.003***
		(0.001)	(0.001)	(0.001)	(0.001)
External CEO × Individualism		0.001	0.001	0.002	0.001
		(0.001)	(0.001)	(0.001)	(0.001)
Family CEO × Freedom of choice			0.099***		0.093**
			(0.034)		(0.037)
External CEO × Freedom of choice			0.055		0.063
			(0.042)		(0.042)
Family CEO × Family ties (unimportance)			0.056		0.062
			(0.077)		(0.072)
External CEO × Family ties (unimportance)			0.162*		0.155**
			(0.082)		(0.077)
Family CEO × Institutional quality			0.039		0.031
			(0.032)		(0.036)
External CEO × Institutional quality			0.065		0.071
			(0.047)		(0.043)
Family CEO × Barrier to entry index			0.049		0.039
			(0.029)		(0.037)
External CEO × Barrier to entry index			0.013		0.019
			(0.034)		(0.032)
Family CEO × Financial development			0.000		0.000
			(0.000)		(0.000)
External CEO × Financial development			-0.002*		-0.002**
			(0.001)		(0.001)
Firm size	0.123***	0.124***	0.123***	0.124***	0.123***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Education (managers)	0.063***	0.064***	0.064***	0.064***	0.064***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Education (non-managers)	0.078***	0.077***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.251***	0.251***	0.252***	0.251***	0.252***
	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)
Managers left	0.010**	0.011**	0.010**	0.011***	0.010***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214
Adjusted R^2	0.368	0.369	0.369	0.155	0.155
Hansen overidentification test (p-value)				0.691	0.191
Kleibergen-Paap F-statistic				14.726	11.583
Anderson-Rubin (p-value)				0.003	0.000

The table reports the full specification of Table 2 including all coefficients. The dependent variable is the quality of management practices. OLS estimates in columns (1)-(3). Second stage results of the instrumental variable estimates in columns (4)-(5), where the interactions between *Family CEO*, *External CEO* and *Individualism* are instrumented with *Genetic Diversity* from Ashraf and Galor (2013) and *No Pronoun Drop* from Tabellini (2008) interacted with *Family CEO* and *External CEO* (see Table F.7 for the first stage estimates). All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm level controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the % of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. The Stock-Yogo (2005) 10% critical value for the Kleibergen-Paap F-statistic, is 7.56 in both columns (4) and (5). Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.3: Determinants of Management Quality of Family Firms

	Percentage of family firms whose management quality is:			
	Low	High	Low	High
	(1)	(2)	(3)	(4)
Individualism	-0.004***	0.003***	-0.003**	0.003**
	(0.001)	(0.001)	(0.002)	(0.001)
Freedom of choice			0.163	0.036
			(0.115)	(0.074)
Family ties (unimportance)			-0.214	-0.001
			(0.178)	(0.111)
Institutional quality			-0.036	0.026
			(0.041)	(0.032)
Barrier to entry index			0.007	0.036
			(0.048)	(0.033)
Financial development			0.001	0.000
			(0.001)	(0.001)
Human capital			-0.018	0.022
			(0.024)	(0.016)
Absolute latitude			0.003	0.000
			(0.003)	(0.002)
Average firm size	-0.132***	0.095***	-0.126***	0.096***
	(0.029)	(0.023)	(0.027)	(0.022)
Observations	290	290	290	290
Adjusted R^2	0.205	0.267	0.233	0.271

The table reports the full specification of Table 3 including all coefficients. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.4: Determinants of Management Quality of Family Firms, country-industry analysis

	Percentage of family firms whose management quality is:				Std. Dev.	
	Low	High	Low	High	Management	
	(1)	(2)	(3)	(4)	(5)	(6)
Individualism × R&D intensity	-0.001***	0.001***	-0.001***	0.001***	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human capital × Skill intensity			-0.001	0.063		0.010
			(0.095)	(0.087)		(0.083)
Capital endowment × Capital intensity			0.000	-0.000		-0.000
			(0.000)	(0.000)		(0.000)
Financial development × External dependence			0.000	-0.000		-0.000
			(0.000)	(0.000)		(0.000)
Institutional quality × Contract intensity			0.074	-0.055		-0.034
			(0.066)	(0.056)		(0.060)
Barrier to entry index × Intangible intensity			0.007	-0.005		0.003
			(0.008)	(0.006)		(0.008)
Average firm size	-0.123***	0.086***	-0.122***	0.083***	0.053**	0.052**
	(0.027)	(0.019)	(0.028)	(0.019)	(0.025)	(0.025)
Observations	290	290	290	290	240	240
Adjusted R^2	0.312	0.348	0.303	0.341	0.061	0.041

The table reports the full specification of Table 4 including all coefficients. The dependent variables in columns (1)-(4) are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The dependent variable in columns (5)-(6) is the standard deviation of the management quality of the family firms by country-industry. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.5: Management Quality and Family Specific Human Capital by Industrialization Stage

	Management quality				
	(1)	(2)	(3)	(4)	(5)
Family firm	-0.047*	-0.208***	-0.031	-0.187***	-0.191***
	(0.024)	(0.056)	(0.027)	(0.064)	(0.065)
Family firm × Individualism		0.003***		0.002***	0.003***
		(0.001)		(0.001)	(0.001)
Family firm × Not industrialized			-0.096***	-0.049	0.155
			(0.031)	(0.033)	(0.096)
Family firm × Not industrialized × Individualism					-0.005**
					(0.002)
Firm size	0.127***	0.127***	0.127***	0.127***	0.127***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.060***	0.060***	0.060***	0.060***	0.060***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.080***	0.080***	0.080***	0.080***	0.080***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.257***	0.256***	0.257***	0.257***	0.257***
	(0.029)	(0.028)	(0.029)	(0.028)	(0.028)
Managers left	0.010**	0.010**	0.010**	0.010**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	7950	7950	7950	7950	7950
Adjusted R^2	0.367	0.368	0.367	0.368	0.368

The table reports the full specification of Table 5 including all coefficients. The dependent variable is the quality of management practices. Not industrialized is a dummy equal 1 if a country is not yet industrialized by 2005 and zero otherwise, according to the *YIT* measure (Bentzen et al., 2013). Data on the timing of industrialization for Singapore are missing. All regressions include firm level and noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Firm controls are: firm size, education of managers and non-managers, dummy for whether the firm is owned by a multinational and the percentage of managers who left the firm in the 12 months before the interview. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism* and *Not industrialized*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.6: Determinants of Management Quality of Family Firms by Industrialization Stage

	Percentage of family firms whose management quality is:							
	Low	High	Low	High	Low	High	Low	High
	Not industrialized		Industrialized		Not industrialized		Industrialized	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individualism × R&D intensity	-0.001	0.002	-0.001***	0.001***	-0.009	0.004	-0.001***	0.001***
	(0.004)	(0.002)	(0.000)	(0.000)	(0.008)	(0.003)	(0.000)	(0.000)
Human capital × Skill intensity					-0.877	-0.018	0.026	0.056
					(0.841)	(0.430)	(0.145)	(0.132)
Capital endowment × Capital intensity					0.000	-0.000	-0.000	-0.000
					(0.000)	(0.000)	(0.000)	(0.000)
Financial development × External dependence					0.005	-0.006***	0.000	-0.000
					(0.005)	(0.002)	(0.000)	(0.000)
Institutional quality × Contract intensity					0.090	-0.080	0.053	-0.047
					(1.121)	(0.530)	(0.083)	(0.079)
Barrier to entry index × Intangible intensity					-0.078	0.001	0.010	-0.001
					(0.047)	(0.019)	(0.009)	(0.009)
Average firm size	-0.027	0.132	-0.130***	0.094***	0.033	0.235	-0.128***	0.092***
	(0.277)	(0.131)	(0.030)	(0.021)	(0.378)	(0.170)	(0.031)	(0.021)
Observations	35	35	249	249	35	35	249	249
Adjusted R^2	0.118	0.257	0.296	0.331	0.050	0.185	0.284	0.321

The table reports the full specification of Table 6 including all coefficients. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 20 countries and 20 industries (2-digit US SIC). Not industrialized and industrialized indicate countries not yet and already industrialized by 2005. Data on the timing of industrialization for Singapore are missing. All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country × industry sector; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

F.2.2 First stage estimates

Table F.7: Instrumental variable estimates – First Stage

Dependent variable is:	Individualism ×					
	Family firm		Family CEO		External CEO	
	(1)	(2)	(3)	(4)	(5)	(6)
Family firm × No Pronoun Drop	37.260***	32.407**				
	(6.026)	(13.495)				
Family firm × Genetic diversity	248.706*	329.533**				
	(141.843)	(130.196)				
Family CEO × No Pronoun Drop			37.558***	32.638**	0.044	-0.151
			(6.012)	(13.250)	(0.094)	(0.124)
Family CEO × Genetic diversity			245.884†	322.690**	-0.028	1.270
			(145.719)	(129.868)	(1.925)	(1.728)
External CEO × No Pronoun Drop			0.554	-1.121	35.162***	34.647**
			(0.615)	(1.001)	(6.809)	(16.509)
External CEO × Genetic diversity			-0.012	-1.514	266.912*	374.793***
			(12.027)	(16.240)	(130.299)	(125.791)
Family firm	-135.984	-117.035				
	(99.481)	(109.469)				
Family firm × Freedom of choice		-9.358				
		(6.737)				
Family firm × Family ties (unimportance)		-11.065				
		(8.230)				
Family firm × Institutional quality		-11.177***				
		(2.541)				
Family firm × Barrier to entry index		-9.795***				
		(3.314)				
Family firm × Financial development		0.062				
		(0.065)				
Family CEO			-134.032	-110.408	0.061	-1.779
			(102.300)	(107.010)	(1.329)	(1.221)
External CEO			0.105	-0.065	-148.919	-161.110
			(8.653)	(15.422)	(90.437)	(118.093)
Family CEO × Freedom of choice				-9.579		0.121
				(6.711)		(0.084)
External CEO × Freedom of choice				0.143		-7.768
				(0.686)		(7.928)
Family CEO × Family ties (unimportance)				-11.164		0.180
				(8.386)		(0.140)
External CEO × Family ties (unimportance)				1.261		-15.096
				(1.501)		(10.841)
Family CEO × Institutional quality				-11.389***		0.025
				(2.634)		(0.033)
External CEO × Institutional quality				-0.138		-9.571***
				(0.434)		(2.644)
Family CEO × Barrier to entry index				-9.940***		0.023
				(3.417)		(0.036)
External CEO × Barrier to entry index				-0.053		-8.724**
				(0.439)		(3.625)
Family CEO × Financial development				0.063		0.001
				(0.063)		(0.001)
External CEO × Financial development				0.013		0.021
				(0.013)		(0.102)
Firm size	-0.041	-0.033	-0.006	-0.035	-0.028	0.001
	(0.049)	(0.025)	(0.032)	(0.023)	(0.032)	(0.014)
Education (managers)	0.029	0.059	0.018	0.053	0.013	0.007
	(0.071)	(0.052)	(0.047)	(0.039)	(0.034)	(0.020)
Education (non-managers)	0.010	-0.040	0.027	-0.034*	-0.018	-0.008
	(0.042)	(0.027)	(0.032)	(0.019)	(0.022)	(0.013)
Multinational	0.295	0.106	0.274*	0.145	0.028	-0.045
	(0.179)	(0.117)	(0.143)	(0.089)	(0.084)	(0.040)
Managers left	-0.022	-0.019	-0.017	-0.024	-0.003	0.005
	(0.044)	(0.023)	(0.049)	(0.026)	(0.019)	(0.010)
Observations	8214	8214	8214	8214	8214	8214
Adjusted R^2	0.973	0.987	0.972	0.986	0.972	0.987

Columns (1)-(2) report the first stage results of the IV estimates in col. (9)-(10) of Table 1 (see also Table F.1), while columns (3)-(6) those for col. (4)-(5) of Table 2 (see also Table F.2). Dependent variables are *Family x Individualism* in columns (1)-(2), *Family CEO x Individualism* in columns (3)-(4) and *External CEO x Individualism* in columns (5)-(6). All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends, year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; † $p = .107$.

F.2.3 Robustness

Table F.8: Management Quality and Productivity of Family Specific Human Capital: one-by-one specification

	Management quality				
	(1)	(2)	(3)	(4)	(5)
Family firm	-0.585***	-0.047**	-0.114***	-0.075**	-0.113**
	(0.200)	(0.021)	(0.031)	(0.026)	(0.041)
Family firm × Freedom of choice	0.077**				
	(0.028)				
Family firm × Family ties (unimportance)		0.156*			
		(0.084)			
Family firm × Institutional quality			0.029***		
			(0.009)		
Family firm × Barrier to entry index				-0.025***	
				(0.008)	
Family firm × Financial development					0.001*
					(0.000)
Firm size	0.124***	0.124***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.063***	0.064***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.254***	0.254***	0.254***	0.254***	0.254***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Managers left	0.010**	0.010**	0.011**	0.011**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214
Adjusted R^2	0.367	0.367	0.368	0.368	0.367

The table reports the one-by-one specification of Table 1 for the base country controls. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.9: Management Quality and Productivity of Family Specific Human Capital: other country variables (one-by-one)

	Management quality						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family firm	-0.203***	-0.136**	-0.049	-0.042	0.033	-0.156*	0.118***
	(0.045)	(0.063)	(0.047)	(0.034)	(0.028)	(0.080)	(0.027)
Family firm × Human capital	0.018***						
	(0.006)						
Family firm × Trust		0.283					
		(0.179)					
Family firm × Ethnic fractionalization			0.006				
			(0.112)				
Family firm × Language fractionalization				-0.022			
				(0.101)			
Family firm × Communitarian Family					-0.168***		
					(0.030)		
Family firm × Authoritarian Family					-0.013		
					(0.078)		
Family firm × Egalitarian nuclear Family					-0.137***		
					(0.040)		
Family firm × Executive constraints						0.018	
						(0.014)	
Family firm × Legal origin (British)							-0.139***
							(0.031)
Family firm × Legal origin (French)							-0.233***
							(0.045)
Family firm × Legal origin (German)							-0.067
							(0.087)
Family firm × Legal origin (Scandinavian)							-0.135***
							(0.041)
Firm size	0.124***	0.124***	0.124***	0.124***	0.127***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.063***	0.063***	0.060***	0.063***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.080***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.254***	0.253***	0.253***	0.253***	0.258***	0.253***	0.251***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.028)	(0.028)
Managers left	0.010**	0.011**	0.010**	0.010**	0.010**	0.011**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	7950	8214	8214
Adjusted R^2	0.368	0.367	0.367	0.367	0.368	0.367	0.368

The table reports the effect of other country variables on the management gap of family and non-family firms. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Human capital*, *Trust*, *Ethnic fractionalization*, *Language fractionalization*, *Communitarian, Authoritarian and Egalitarian Family*, *Excecutive constraints* and *Legal origins dummies*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.10: Management Quality and Productivity of Family Specific Human Capital: *Individualism* and other country variables

	Management quality						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family firm	-0.242***	-0.194***	-0.217***	-0.203***	-0.054	-0.129**	-0.039
	(0.060)	(0.057)	(0.066)	(0.063)	(0.120)	(0.061)	(0.065)
Family firm × Individualism	0.002**	0.003***	0.003***	0.003***	0.001	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family firm × Human capital	0.007						
	(0.007)						
Family firm × Trust		-0.159					
		(0.163)					
Family firm × Ethnic fractionalization			0.026				
			(0.087)				
Family firm × Language fractionalization				-0.025			
				(0.060)			
Family firm × Communitarian Family					-0.128*		
					(0.061)		
Family firm × Authoritarian Family					0.010		
					(0.083)		
Family firm × Egalitarian nuclear Family					-0.092		
					(0.071)		
Family firm × Executive constraints						-0.025	
						(0.016)	
Family firm × Legal origin (British)							-0.181***
							(0.035)
Family firm × Legal origin (French)							-0.184***
							(0.053)
Family firm × Legal origin (German)							-0.070
							(0.073)
Family firm × Legal origin (Scandinavian)							-0.162***
							(0.042)
Firm size	0.124***	0.124***	0.124***	0.124***	0.127***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.063***	0.063***	0.060***	0.063***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.080***	0.077***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.253***	0.253***	0.253***	0.253***	0.258***	0.253***	0.252***
	(0.028)	(0.027)	(0.027)	(0.028)	(0.029)	(0.027)	(0.028)
Managers left	0.011**	0.011**	0.011**	0.011**	0.010**	0.011**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	7950	8214	8214
Adjusted R^2	0.368	0.368	0.368	0.368	0.368	0.368	0.368

The table reports the robustness of *Individualism* to the other country variables in Table F.9. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Human capital*, *Trust*, *Ethnic fractionalization*, *Language fractionalization*, *Communitarian, Authoritarian and Egalitarian Family*, *Excecutive constraints* and *Legal origins dummies*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.11: Management Quality and Productivity of Family Specific Human Capital: single institutional measures (one-by-one)

	Management quality									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family firm	-0.112***	-0.102***	0.066	0.095*	0.057	0.557**	0.155	0.109*	0.095	0.225
	(0.031)	(0.035)	(0.053)	(0.054)	(0.037)	(0.234)	(0.229)	(0.061)	(0.141)	(0.229)
Family firm × Corruption	0.062***									
	(0.018)									
Family firm × Rule of law		0.058**								
		(0.025)								
Family firm × Starting business procedure (number)			-0.012*							
			(0.006)							
Family firm × Ln(1+Starting business time (days))				-0.042**						
				(0.017)						
Family firm × Ln(1+Starting business cost (% of income per capita))					-0.051***					
					(0.014)					
Family firm × Ln(1+Enforcing contracts time (days))						-0.095**				
						(0.036)				
Family firm × Ln(1+Enforcing contracts cost (% of claim))							-0.064			
							(0.070)			
Family firm × Ln(1+Paying taxes (# per year))								-0.057**		
								(0.021)		
Family firm × Ln(1+Paying taxes time (hours per year))									-0.026	
									(0.025)	
Family firm × Ln(1+Paying taxes (total tax rate % of profit))										-0.069
										(0.058)
Firm size	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.064***	0.063***	0.064***	0.063***	0.064***	0.063***	0.063***	0.063***	0.063***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.254***	0.254***	0.253***	0.254***	0.254***	0.254***	0.253***	0.254***	0.253***	0.253***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Managers left	0.011**	0.011**	0.011**	0.011**	0.011**	0.010**	0.010**	0.010**	0.011**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214	8214	8214	8214	8214	8214
Adjusted R^2	0.368	0.368	0.368	0.368	0.368	0.368	0.367	0.367	0.367	0.367

The table reports the coefficients of the variables of the institutional indexes (*Insitutional quality* and *Barrier to entry index*). The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Corruption*, *Rule of law*, *Starting business procedure (number)*, *Ln(1+Starting business time (days))*, *Ln(1+Starting business cost (% of income per capita))*, *Ln(1+Enforcing contracts time (days)*, *Ln(1+Enforcing contracts cost (% of claim))*, *Ln(1+Paying taxes (# per year))*, *Ln(1+Paying taxes time (hours per year))* and *Ln(1+Paying taxes (total tax rate % of profit))*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.12: Management Quality and Productivity of Family Specific Human Capital: *Individualism* and single institutional measures

	Management quality									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family firm	-0.188***	-0.203***	-0.156*	-0.244	-0.075	0.138	0.013	-0.105	-0.389**	-0.084
	(0.053)	(0.056)	(0.090)	(0.189)	(0.088)	(0.244)	(0.195)	(0.077)	(0.172)	(0.164)
Family firm × Individualism	0.002**	0.002**	0.002***	0.003*	0.001	0.002***	0.003***	0.002***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family firm × Corruption	0.034*									
	(0.019)									
Family firm × Rule of law		0.015								
		(0.028)								
Family firm × Starting business procedure (number)			-0.003							
			(0.007)							
Family firm × Ln(1+Starting business time (days))				0.006						
				(0.032)						
Family firm × Ln(1+Starting business cost (% of income per capita))					-0.029					
					(0.019)					
Family firm × Ln(1+Enforcing contracts time (days))						-0.050				
						(0.036)				
Family firm × Ln(1+Enforcing contracts cost (% of claim))							-0.071			
							(0.052)			
Family firm × Ln(1+Paying taxes (# per year))								-0.031*		
								(0.018)		
Family firm × Ln(1+Paying taxes time (hours per year))									0.026	
									(0.021)	
Family firm × Ln(1+Paying taxes (total tax rate % of profit))										-0.030
										(0.040)
Firm size	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.063***	0.063***	0.064***	0.063***	0.063***	0.063***	0.063***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.254***	0.253***	0.253***	0.253***	0.253***	0.254***	0.253***	0.253***	0.253***	0.253***
	(0.028)	(0.027)	(0.027)	(0.027)	(0.028)	(0.028)	(0.027)	(0.028)	(0.027)	(0.027)
Managers left	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214	8214	8214	8214	8214	8214
Adjusted R^2	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368	0.368

The table reports the robustness of *Individualism* to the single components of the institutional indexes (*Insitutional quality* and *Barrier to entry index*). The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Corruption*, *Rule of law*, *Starting business procedure (number)*, *Ln(1+Starting business time (days))*, *Ln(1+Starting business cost (% of income per capita))*, *Ln(1+Enforcing contracts time (days)*, *Ln(1+Enforcing contracts cost (% of claim))*, *Ln(1+Paying taxes (# per year))*, *Ln(1+Paying taxes time (hours per year))* and *Ln(1+Paying taxes (total tax rate % of profit))*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.13: Management Quality and Family Specific Human Capital within the family: one-by-one specification

	Management quality				
	(1)	(2)	(3)	(4)	(5)
Family CEO	-0.611***	-0.072***	-0.133***	-0.097***	-0.144***
	(0.211)	(0.024)	(0.036)	(0.030)	(0.046)
External CEO	-0.212	0.068***	0.006	0.053*	0.066
	(0.462)	(0.020)	(0.038)	(0.030)	(0.065)
Family CEO × Freedom of choice	0.077**				
	(0.030)				
External CEO × Freedom of choice	0.041				
	(0.066)				
Family CEO × Family ties (unimportance)		0.108			
		(0.091)			
External CEO × Family ties (unimportance)		0.269***			
		(0.065)			
Family CEO × Institutional quality			0.027**		
			(0.010)		
External CEO × Institutional quality			0.029*		
			(0.014)		
Family CEO × Barrier to entry index				-0.024**	
				(0.010)	
External CEO × Barrier to entry index				-0.018	
				(0.013)	
Family CEO × Financial development					0.001**
					(0.000)
External CEO × Financial development					0.000
					(0.001)
Firm size	0.123***	0.123***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.064***	0.064***	0.064***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.078***	0.078***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.252***	0.252***	0.252***	0.252***	0.251***
	(0.027)	(0.027)	(0.027)	(0.028)	(0.027)
Managers left	0.010**	0.010**	0.010**	0.010**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214
Adjusted R^2	0.368	0.368	0.369	0.369	0.368

The table reports the one-by-one specification of Table 2 for the base country controls. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.14: Management Quality and Family Specific Human Capital within the family: two-by-two specification

	Management quality				
	(1)	(2)	(3)	(4)	(5)
Family CEO	-0.570**	-0.234***	-0.237***	-0.223***	-0.242***
	(0.222)	(0.070)	(0.065)	(0.066)	(0.065)
External CEO	-0.199	0.053	0.046	0.102	0.025
	(0.472)	(0.053)	(0.064)	(0.059)	(0.064)
Family CEO× Individualism	0.003***	0.003***	0.002**	0.002**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
External CEO × Individualism	0.001	0.000	-0.001	-0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family CEO× Freedom of choice	0.050				
	(0.032)				
External CEO × Freedom of choice	0.033				
	(0.063)				
Family CEO× Family ties (unimportance)		0.048			
		(0.100)			
External CEO × Family ties (unimportance)		0.263***			
		(0.067)			
Family CEO× Institutional quality			0.007		
			(0.010)		
External CEO × Institutional quality			0.037*		
			(0.018)		
Family CEO× Barrier to entry index				-0.006	
				(0.010)	
External CEO × Barrier to entry index				-0.026*	
				(0.014)	
Family CEO× Financial development					0.000
					(0.000)
External CEO × Financial development					-0.000
					(0.001)
Firm size	0.124***	0.123***	0.124***	0.124***	0.124***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.064***	0.064***	0.064***	0.064***	0.064***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.078***	0.077***	0.077***	0.077***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.251***	0.251***	0.251***	0.251***	0.251***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Managers left	0.011**	0.010**	0.010**	0.010**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	8214	8214	8214	8214	8214
Adjusted R^2	0.369	0.369	0.369	0.369	0.369

The table reports the robustness of *Individualism* to the other base country controls in the two-by-two specification. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Freedom of choice*, *Family ties (unimportance)*, *Institutional quality*, *Barrier to entry index* and *Financial development*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.15: Management Quality and Family Specific Human Capital within the family: *Individualism* and other country variables

	Management quality						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family CEO	-0.257***	-0.223***	-0.263***	-0.243***	-0.062	-0.162**	-0.070
	(0.066)	(0.068)	(0.075)	(0.076)	(0.123)	(0.076)	(0.063)
External CEO	-0.093	0.019	0.083	0.067	0.145	0.060	0.107
	(0.119)	(0.062)	(0.074)	(0.056)	(0.108)	(0.089)	(0.104)
Family CEO × Individualism	0.003**	0.004***	0.003***	0.003***	0.001	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
External CEO × Individualism	-0.001	0.001	0.001	0.001	-0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Family CEO × Human capital	0.003						
	(0.007)						
External CEO × Human capital	0.023						
	(0.015)						
Family CEO × Trust		-0.205					
		(0.195)					
External CEO × Trust		0.074					
		(0.241)					
Family CEO × Ethnic fractionalization			0.071				
			(0.093)				
External CEO × Ethnic fractionalization			-0.189				
			(0.131)				
Family CEO × Language fractionalization				0.007			
				(0.065)			
External CEO × Language fractionalization				-0.194***			
				(0.065)			
Family CEO × Communitarian family					-0.123*		
					(0.064)		
External CEO × Communitarian family					-0.206***		
					(0.059)		
Family CEO × Authoritarian family					-0.023		
					(0.085)		
External CEO × Authoritarian family					0.119*		
					(0.062)		
Family CEO × Egalitarian nuclear family					-0.111		
					(0.071)		
External CEO × Egalitarian nuclear family					-0.052		
					(0.074)		
Family CEO × Executive constraints						-0.025	
						(0.018)	
External CEO × Executive constraints						-0.011	
						(0.034)	
Family CEO × Legal origin (British)							-0.158***
							(0.026)
External CEO × Legal origin (British)							-0.177**
							(0.076)
Family CEO × Legal origin (French)							-0.178***
							(0.053)
External CEO × Legal origin (French)							-0.122
							(0.074)
Family CEO × Legal origin (German)							-0.077
							(0.060)
External CEO × Legal origin (German)							0.033
							(0.076)
Family CEO × Legal origin (Scandinavian)							-0.165***
							(0.036)
External CEO × Legal origin (Scandinavian)							-0.114
							(0.075)
Firm size	0.124***	0.124***	0.123***	0.124***	0.126***	0.124***	0.123***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (managers)	0.063***	0.063***	0.064***	0.064***	0.060***	0.064***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Education (non-managers)	0.078***	0.077***	0.077***	0.077***	0.080***	0.077***	0.078***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Multinational	0.251***	0.251***	0.251***	0.251***	0.255***	0.251***	0.250***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.028)	(0.027)	(0.027)
Managers left	0.010**	0.010**	0.011**	0.011**	0.010**	0.011**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Constant	2.286***	2.336***	2.331***	2.293***	4.041***	2.324***	2.313***
	(0.446)	(0.447)	(0.442)	(0.443)	(0.302)	(0.445)	(0.445)
Observations	8214	8214	8214	8214	7950	8214	8214
Adjusted R^2	0.369	0.369	0.369	0.369	0.369	0.369	0.369

The table reports the robustness of *Individualism* to other country variables. The dependent variable is the quality of management practices. All regressions include noise controls, country and industry-sector fixed effects, country-specific time trends and year dummies. Noise controls are: interviewer dummies, manager's tenure and seniority, day of month and month of the year dummies. Country level variables (i.e., *Individualism*, *Human capital*, *Trust*, *Ethnic fractionalization*, *Language fractionalization*, *Communitarian*, *Authoritarian and Egalitarian Family*, *Excecutive constraints* and *Legal origins dummies*) are captured by the country fixed effects. Robust standard errors clustered at country level in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.16: Determinants of Management Quality of Family Firms. Country robustness: *Individualism* and other country controls (two-by-two)

	Percentage of family firms whose management quality is:													
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Individualism	-0.004***	0.003***	-0.003***	0.003***	-0.003**	0.003***	-0.003**	0.003***	-0.003**	0.003***	-0.002*	0.002**	-0.003*	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Freedom of choice	0.074	-0.002												
	(0.082)	(0.048)												
Family ties (unimportance)			-0.170	0.102										
			(0.108)	(0.077)										
Institutional quality					-0.030*	0.014								
					(0.016)	(0.012)								
Barrier to entry index							0.017	-0.005						
							(0.013)	(0.008)						
Financial development									-0.001	0.000				
									(0.001)	(0.000)				
Human capital											-0.029**	0.019***		
											(0.011)	(0.006)		
Absolute latitude													-0.002	0.002
													(0.003)	(0.002)
Average firm size	-0.130***	0.095***	-0.127***	0.092***	-0.138***	0.098***	-0.138***	0.097***	-0.136***	0.098***	-0.139***	0.100***	-0.134***	0.098***
	(0.030)	(0.023)	(0.028)	(0.023)	(0.027)	(0.023)	(0.028)	(0.022)	(0.029)	(0.023)	(0.027)	(0.022)	(0.030)	(0.024)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.208	0.265	0.214	0.271	0.216	0.269	0.211	0.271	0.207	0.273	0.225	0.280	0.205	0.271

The table reports the robustness of *Individualism* to the country controls of Table 3 (see also F.3) in the two-by-two specification. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.17: Determinants of Management Quality of Family Firms. Country robustness: other country controls

	Percentage of family firms whose management quality is:													
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Individualism	-0.002*	0.003***	-0.003**	0.002**	-0.004***	0.003***	-0.003**	0.003***	-0.003**	0.003***	-0.003**	0.003**	-0.003*	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Ln(per capita GDP)	-0.100**	0.050**												
	(0.039)	(0.018)												
Trust			-0.095	0.188									0.061	0.214
			(0.232)	(0.179)									(0.300)	(0.250)
Ethnic fractionalization					0.254	0.083							0.243	0.106
					(0.223)	(0.128)							(0.206)	(0.123)
Corruption							-0.046	0.018					-0.082	0.007
							(0.029)	(0.020)					(0.096)	(0.073)
Rule of law									-0.050	0.022			0.052	0.024
									(0.033)	(0.026)			(0.113)	(0.078)
Starting business procedure (number)											0.008	-0.003	0.002	0.006
											(0.006)	(0.005)	(0.013)	(0.009)
Average firm size	-0.143***	0.101***	-0.134***	0.099***	-0.139***	0.093***	-0.136***	0.097***	-0.135***	0.097***	-0.138***	0.097***	-0.142***	0.094***
	(0.028)	(0.023)	(0.031)	(0.023)	(0.029)	(0.024)	(0.027)	(0.023)	(0.027)	(0.023)	(0.029)	(0.024)	(0.028)	(0.024)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.228	0.275	0.203	0.268	0.211	0.266	0.213	0.267	0.211	0.267	0.207	0.265	0.210	0.262

The table reports the robustness of *Individualism* to other country controls in the cross-country specification (see also Tables 3 and F.3) both in the two-by-two and in the full specification. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.18: Determinants of Management Quality of Family Firms. Country robustness. Other dependent variables: 25th-75th percentiles of management quality

	Percentage of family firms whose management quality is:															
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Individualism	-0.003***	0.002***	-0.003**	0.002***	-0.002*	0.002***	-0.002*	0.002***	-0.002*	0.002***	-0.002	0.002***	-0.003*	0.002***	-0.003*	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Freedom of choice	0.091	-0.010													0.204*	0.020
	(0.071)	(0.032)													(0.104)	(0.041)
Family ties (unimportance)			-0.125	0.022											-0.206	-0.025
			(0.101)	(0.065)											(0.141)	(0.085)
Institutional quality					-0.029*	0.012									-0.013	0.025
					(0.015)	(0.009)									(0.037)	(0.024)
Barrier to entry index							0.019	-0.005							0.032	0.026
							(0.012)	(0.007)							(0.042)	(0.018)
Financial development									-0.001	0.000*					0.001	0.000
									(0.001)	(0.000)					(0.001)	(0.000)
Human capital											-0.025**	0.010**			-0.008	0.011
											(0.012)	(0.005)			(0.021)	(0.010)
Absolute latitude													-0.002	0.000	0.003	-0.001
													(0.002)	(0.001)	(0.002)	(0.002)
Average firm size	-0.124***	0.052***	-0.123***	0.051***	-0.132***	0.054***	-0.133***	0.054***	-0.130***	0.054***	-0.133***	0.054***	-0.129***	0.052***	-0.123***	0.052***
	(0.033)	(0.016)	(0.032)	(0.015)	(0.031)	(0.015)	(0.032)	(0.016)	(0.032)	(0.015)	(0.031)	(0.015)	(0.033)	(0.016)	(0.028)	(0.013)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.213	0.237	0.211	0.237	0.218	0.245	0.212	0.239	0.215	0.249	0.222	0.247	0.206	0.237	0.234	0.244

The table reports the robustness of *Individualism* in the cross-country specification (see also Tables 3 and F.3) when using other measures of the dependent variables, that are now defined as the percentage of family firms below the 25th (Low) and above the 75th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table F.19: Determinants of Management Quality of Family Firms. Country robustness. Other dependent variable: 50th percentile (median) of management quality

	Percentage of family firms whose management quality is below the median							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individualism	-0.004***	-0.004***	-0.003***	-0.003***	-0.003***	-0.002*	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Freedom of choice	0.019							0.010
	(0.089)							(0.115)
Family ties (unimportance)		-0.238*						-0.134
		(0.123)						(0.185)
Institutional quality			-0.019					-0.044
			(0.019)					(0.049)
Barrier to entry index				0.006				-0.045
				(0.014)				(0.055)
Financial development					-0.001			0.001
					(0.001)			(0.001)
Human capital						-0.034***		-0.041
						(0.011)		(0.025)
Absolute latitude							-0.003	0.001
							(0.002)	(0.003)
Average firm size	-0.117***	-0.110***	-0.121***	-0.120***	-0.120***	-0.126***	-0.122***	-0.112***
	(0.025)	(0.021)	(0.022)	(0.024)	(0.023)	(0.021)	(0.024)	(0.019)
Observations	290	290	290	290	290	290	290	290
Adjusted R^2	0.244	0.270	0.250	0.245	0.249	0.278	0.253	0.283

The table reports the robustness of *Individualism* in the cross-country specification (see also Tables 3 and F.3) when using as dependent variable the percentage of family firms below the 50th percentile (median) of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include continent and industry fixed effects. Robust standard errors in parentheses are clustered at country level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.20: Determinants of Management Quality of Family Firms. Country-industry robustness: *Individualism* × *R&D intensity* and the other country-industry controls (two-by-two)

	Percentage of family firms whose management quality is:									
	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Individualism × R&D intensity	-0.001***	0.001***	-0.001**	0.001***	-0.001**	0.001***	-0.001***	0.001***	-0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human capital × Skill intensity	0.025	0.015								
	(0.091)	(0.071)								
Capital endowment × Capital intensity			0.000	-0.000						
			(0.000)	(0.000)						
Financial development × External dependence					-0.000	-0.000				
					(0.000)	(0.000)				
Institutional quality × Contract intensity							0.045	-0.020		
							(0.057)	(0.046)		
Barrier to entry index × Intangible intensity									0.005	-0.004
									(0.007)	(0.006)
Average firm size	-0.124***	0.085***	-0.123***	0.086***	-0.123***	0.086***	-0.123***	0.086***	-0.122***	0.085***
	(0.028)	(0.019)	(0.027)	(0.019)	(0.027)	(0.019)	(0.027)	(0.019)	(0.027)	(0.019)
Observations	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.309	0.345	0.310	0.346	0.309	0.347	0.311	0.345	0.310	0.346

The table reports the robustness of *Individualism* × *R&D intensity* to the other country-industry controls of Table 4 (see also F.4) in the two-by-two specification. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.21: Determinants of Management Quality of Family Firms. Country-industry robustness: *Individualism* × *R&D intensity* and other country × industry controls

	Percentage of family firms whose management quality is:											
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Individualism × R&D intensity	-0.001**	0.001***	-0.001***	0.001***	-0.001***	0.001***	-0.001**	0.001***	-0.001**	0.001***	-0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(per capita GDP) × Valued added	-0.000***	-0.000									-0.000**	-0.000
	(0.000)	(0.000)									(0.000)	(0.000)
Institutional quality × Intangible intensity			-0.011	0.005							-0.016	0.007
			(0.009)	(0.008)							(0.010)	(0.008)
Barrier to entry index × Contract intensity					-0.052	0.024					-0.058	0.049
					(0.046)	(0.040)					(0.057)	(0.047)
Capital endowment × External dependence							0.000	-0.000*			0.000	-0.000*
							(0.000)	(0.000)			(0.000)	(0.000)
Financial development × Capital intensity									-0.000	-0.000	0.000	-0.000
									(0.002)	(0.001)	(0.002)	(0.001)
Average firm size	-0.121***	0.086***	-0.122***	0.086***	-0.122***	0.085***	-0.123***	0.088***	-0.123***	0.086***	-0.120***	0.087***
	(0.027)	(0.019)	(0.027)	(0.019)	(0.027)	(0.019)	(0.028)	(0.019)	(0.027)	(0.019)	(0.028)	(0.019)
Observations	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.314	0.345	0.313	0.346	0.312	0.346	0.309	0.352	0.309	0.345	0.311	0.346

The table reports the robustness of *Individualism* × *R&D intensity* to other country-industry controls in the country-industry specification (see also Tables 4 and F.4) both in the two-by-two and in the full specification. The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.22: Determinants of Management Quality of Family Firms. Country-industry robustness: Other country × R&D intensity interactions

	Percentage of family firms whose management quality is:															
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Individualism × R&D intensity	-0.001**	0.001***	-0.001**	0.001***	-0.001**	0.001***	-0.001**	0.001***	-0.001***	0.001***	-0.001***	0.001***	-0.001***	0.001***	-0.001**	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Freedom of choice × R&D intensity	0.003	0.004													0.010	0.006
	(0.012)	(0.012)													(0.014)	(0.015)
Family ties (unimportance) × R&D intensity			0.002	-0.000											0.010	-0.016
			(0.023)	(0.023)											(0.031)	(0.027)
Human capital × R&D intensity					-0.000	0.001									-0.007	0.005
					(0.003)	(0.003)									(0.005)	(0.005)
Capital endowment × R&D intensity							0.000	-0.000							0.000	-0.000
							(0.000)	(0.000)							(0.000)	(0.000)
Financial development × R&D intensity									-0.000	-0.000					-0.000	-0.000
									(0.000)	(0.000)					(0.000)	(0.000)
Institutional quality × R&D intensity											0.003	0.001			0.008	0.017**
											(0.004)	(0.003)			(0.011)	(0.008)
Barrier to entry index × R&D intensity													-0.003	0.002	-0.002	0.017**
													(0.004)	(0.004)	(0.010)	(0.007)
Average firm size	-0.122***	0.086***	-0.123***	0.086***	-0.123***	0.085***	-0.124***	0.087***	-0.123***	0.086***	-0.125***	0.085***	-0.125***	0.087***	-0.127***	0.087***
	(0.028)	(0.019)	(0.028)	(0.019)	(0.028)	(0.019)	(0.027)	(0.019)	(0.027)	(0.019)	(0.028)	(0.019)	(0.028)	(0.019)	(0.029)	(0.019)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.309	0.345	0.309	0.345	0.309	0.345	0.310	0.347	0.309	0.346	0.311	0.345	0.311	0.345	0.301	0.344

The table reports the robustness of *Individualism × R&D intensity* to other interactions of *R&D intensity* with the base country controls both in the two-by-two and in the full specification (see also Tables 4 and F.4). The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digits US SIC). All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.23: Determinants of Management Quality of Family Firms. Country-industry robustness. Other dependent variables: 25th-75th percentiles of management quality

	Percentage of family firms whose management quality is:											
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Individualism × R&D intensity	-0.001***	0.000*	-0.001***	0.000**	-0.001***	0.000**	-0.001***	0.000**	-0.001***	0.000**	-0.001***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human capital × Skill intensity	-0.020	0.049									-0.016	0.051
	(0.092)	(0.046)									(0.099)	(0.049)
Capital endowment × Capital intensity			-0.000	0.000							-0.000	0.000
			(0.000)	(0.000)							(0.000)	(0.000)
Financial development × External dependence					0.000	-0.000					0.000	-0.000
					(0.000)	(0.000)					(0.000)	(0.000)
Institutional quality × Contract intensity							-0.004	0.040			0.037	0.039
							(0.058)	(0.028)			(0.065)	(0.032)
Barrier to entry index × Intangible intensity									0.021***	-0.000	0.022***	0.001
									(0.007)	(0.003)	(0.007)	(0.003)
Average firm size	-0.114***	0.033**	-0.115***	0.034**	-0.115***	0.034**	-0.115***	0.034**	-0.113***	0.034**	-0.112***	0.033**
	(0.026)	(0.014)	(0.026)	(0.014)	(0.026)	(0.014)	(0.026)	(0.014)	(0.026)	(0.014)	(0.026)	(0.014)
Observations	290	290	290	290	290	290	290	290	290	290	290	290
Adjusted R^2	0.307	0.319	0.307	0.317	0.307	0.320	0.307	0.322	0.328	0.317	0.319	0.317

The table reports the robustness of *Individualism × R&D intensity* in the country-industry specification (see also Tables 4 and F.4) when using other measures of dependent variables, that are now defined as the percentage of family firms below the 25th (Low) and above the 75th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry sector fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.24: Determinants of Management Quality of Family Firms. Country-industry robustness. Other dependent variable: 50th percentile (median) of management quality

	Percentage of family firms whose management quality is below the median					
	(1)	(2)	(3)	(4)	(5)	(6)
Individualism × R&D intensity	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human capital × Skill intensity	0.016					0.011
	(0.085)					(0.088)
Capital endowment × Capital intensity		0.000				0.000
		(0.000)				(0.000)
Financial development × External dependence			0.000			0.000
			(0.000)			(0.000)
Institutional quality × Contract intensity				-0.028		-0.003
				(0.054)		(0.062)
Barrier to entry index × Intangible intensity					0.007	0.006
					(0.007)	(0.007)
Average firm size	-0.112***	-0.111***	-0.111***	-0.111***	-0.110***	-0.111***
	(0.025)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)
Observations	290	290	290	290	290	290
Adjusted R^2	0.370	0.372	0.371	0.371	0.373	0.364

The table reports the robustness of *Individualism* × *R&D intensity* in the country-industry specification (see also Tables 4 and F.4) when using as dependent variable the percentage of family firms below the 50th percentile (median) of management quality distribution. The units of analysis are country-industry observations for 21 countries and 20 industries (2-digit US SIC). All regressions include country and industry sector fixed effects. Robust standard errors in parentheses are clustered at country-industry level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table F.25: Determinants of Management Quality of Family Firms by Industrialization Stage. Country-industry robustness: other benchmark years

	Percentage of family firms whose management quality is:							
	Low	High	Low	High	Low	High	Low	High
	Not industrialized		Industrialized		Not industrialized		Industrialized	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: benchmark year 1986							
Individualism × R&D intensity	-0.001	0.001	-0.001***	0.001***	-0.001	0.001	-0.001**	0.001**
	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)
Human capital × Skill intensity					-0.062	0.050	-0.017	0.103
					(0.226)	(0.114)	(0.190)	(0.176)
Capital endowment × Capital intensity					-0.000	-0.000	0.000	-0.000
					(0.000)	(0.000)	(0.000)	(0.000)
Financial development × External dependence					0.000	0.000	-0.000	-0.000
					(0.001)	(0.001)	(0.000)	(0.000)
Institutional quality × Contract intensity					0.061	-0.066	0.040	-0.026
					(0.154)	(0.068)	(0.094)	(0.094)
Barrier to entry index × Intangible intensity					0.001	0.003	0.003	0.009
					(0.029)	(0.010)	(0.014)	(0.014)
Average firm size	-0.115**	0.045	-0.139***	0.110***	-0.115*	0.045	-0.137***	0.108***
	(0.057)	(0.031)	(0.032)	(0.024)	(0.058)	(0.032)	(0.033)	(0.025)
Observations	87	87	197	197	87	87	197	197
Adjusted R^2	0.313	0.414	0.250	0.286	0.256	0.386	0.229	0.273
	Panel B: benchmark year 1987							
Individualism × R&D intensity	-0.000	0.001	-0.001***	0.001***	-0.003	0.002	-0.001***	0.001***
	(0.002)	(0.001)	(0.000)	(0.000)	(0.003)	(0.002)	(0.000)	(0.000)
Human capital × Skill intensity					-0.334	0.140	-0.060	0.118
					(0.291)	(0.153)	(0.183)	(0.164)
Capital endowment × Capital intensity					0.000	-0.000	0.000	-0.000
					(0.000)	(0.000)	(0.000)	(0.000)
Financial development × External dependence					0.001	-0.000	-0.000	-0.000
					(0.002)	(0.001)	(0.000)	(0.000)
Institutional quality × Contract intensity					0.073	-0.071	0.045	-0.018
					(0.217)	(0.094)	(0.089)	(0.093)
Barrier to entry index × Intangible intensity					-0.040**	0.009	0.002	0.007
					(0.019)	(0.012)	(0.013)	(0.014)
Average firm size	-0.106*	0.030	-0.125***	0.100***	-0.096	0.026	-0.124***	0.099***
	(0.055)	(0.053)	(0.032)	(0.022)	(0.060)	(0.060)	(0.033)	(0.023)
Constant	1.372***	-0.229	1.228***	-0.315	2.374**	-0.625	1.353*	-0.454
	(0.418)	(0.316)	(0.268)	(0.223)	(0.991)	(0.597)	(0.770)	(0.633)
Observations	69	69	215	215	69	69	215	215
Adjusted R^2	0.469	0.406	0.270	0.318	0.449	0.349	0.250	0.309

The table reports the robustness of *Individualism × R&D intensity* in the country-industry specification when using different benchmark years for distinguishing between industrialized and not industrialized countries (see also Table 6). The dependent variables are the percentage of family firms below the 40th (Low) and above the 60th (High) percentile of management quality distribution. The units of analysis are country-industry observations for 20 countries and 20 industries (2-digit US SIC). Not industrialized and industrialized indicate countries not yet and already industrialized by year 1986 (Panel A) or 1987 (Panel B). Data on the timing of industrialization for Singapore are missing. All regressions include country and industry fixed effects. Robust standard errors in parentheses are clustered at country × industry sector; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

F.2.4 Summary Statistics

Table F.26: Summary statistics: Firm level sample

Variable	Obs.	Mean	St. Dev.	Min	Max
Firm variables (WMS)					
Management quality	8214	2.937	0.678	1.000	4.889
Family firm	8214	0.180	0.385	0.000	1.000
Family CEO	8214	0.151	0.359	0.000	1.000
External CEO	8214	0.029	0.168	0.000	1.000
Firm size	8214	5.844	1.155	0.000	12.078
Education (managers)	8214	3.725	1.146	0.000	4.615
Education (non-managers)	8214	1.600	1.355	0.000	4.615
Multinational	8214	0.465	0.499	0.000	1.000
Managers left	8214	0.995	1.258	0.000	4.615
Country variables					
Individualism	8214	59.871	25.604	20	91
Freedom of choice	8214	7.066	0.493	5.776	7.869
Family ties (unimportance)	8214	0.011	0.256	-0.392	0.638
Institutional quality	8214	2.267	1.901	-1.239	4.376
Barrier to entry index	8214	-1.389	2.239	-4.910	2.362
Financial development	8214	94.485	49.142	15.896	200.732
Year of industrial transition (YIT)	7950	1940.037	64.223	1801	2005
Genetic diversity	8214	0.718	0.017	0.667	0.742
No Pronoun Drop	8214	0.505	0.493	0.000	1.000
Ln (per capita GDP)	8214	9.774	0.881	7.841	10.632
Human capital	8214	9.068	2.684	3.781	13.096
Capital endowment	8214	132041.005	76529.407	10360.698	249579.063
Trust	8214	0.343	0.139	0.077	0.648
Ethnic fractionalization	8214	0.269	0.194	0.012	0.712
Language fractionalization	8214	0.223	0.230	0.018	0.807
Communitarian family	7950	0.173	0.378	0.000	1.000
Authoritarian family	7950	0.137	0.344	0.000	1.000
Egalitarian nuclear family	7950	0.334	0.472	0.000	1.000
Absolute nuclear family	7950	0.355	0.479	0.000	1.000
Executive constraints	8214	5.685	1.678	2.537	7.000
Legal origin (British)	8214	0.491	0.500	0.000	1.000
Legal origin (French)	8214	0.287	0.453	0.000	1.000
Legal origin (Socialist)	8214	0.108	0.310	0.000	1.000
Legal origin (German)	8214	0.069	0.253	0.000	1.000
Legal origin (Scandinavian)	8214	0.045	0.208	0.000	1.000
Absolute latitude	8214	37.614	15.593	1.367	62
Corruption	8214	1.090	1.022	-0.499	2.353
Rule of law	8214	0.959	0.838	-0.649	1.837
Starting business procedure (number)	8214	8.736	4.188	2.000	17.000
Ln(1+Starting business time (days))	8214	3.264	1.097	1.386	5.056
Ln(1+Starting business cost (% of income per capita))	8214	1.894	1.231	0.182	3.960
Ln(1+Enforcing contracts time (days))	8214	6.224	0.539	4.796	7.259
Ln(1+Enforcing contracts cost (% of claim))	8214	3.101	0.373	2.493	3.704
Ln(1+Paying taxes (# per year))	8214	2.750	0.694	1.792	4.143
Ln(1+Paying taxes time (hours per year))	8214	5.556	0.906	3.912	7.864
Ln(1+Paying taxes (total tax rate % of profit))	8214	3.934	0.340	3.270	4.685

Table F.27: Summary statistics: country-sector sample

Variable	Obs.	Mean	St. Dev.	Min	Max
		WMS variables			
Family quality^{Low} (40th)	290	0.513	0.345	0.000	1.000
Family quality^{High} (60th)	290	0.255	0.277	0.000	1.000
Family quality^{Low} (25th)	290	0.373	0.333	0.000	1.000
Family quality^{High} (75th)	290	0.120	0.174	0.000	0.667
Family quality (50th)	290	0.624	0.329	0.000	1.000
Std. Deviation Management Quality	240	0.543	0.239	0.039	1.650
Average firm size	290	5.813	0.801	3.912	8.076
		Country variables			
Individualism	290	58.034	23.004	20.000	91.000
Freedom of choice	290	7.003	0.560	5.776	7.869
Family ties (unimportance)	290	-0.002	0.247	-0.392	0.638
Institutional quality	290	2.377	1.689	-1.239	4.376
Barrier to entry index	290	-1.257	2.078	-4.910	2.362
Financial development	290	86.393	48.979	15.896	200.732
Ln (per capita GDP)	290	9.854	0.750	7.841	10.632
Human capital	290	9.258	2.370	3.781	13.096
Capital endowment	290	140777.783	69701.071	10360.698	249579.063
Year of industrial transition (YIT)	284	1950.106	50.902	1801.000	2005.000
Not yet industrialized by 2005	284	0.123	0.329	0.000	1.000
Not yet industrialized by 1986	284	0.306	0.462	0.000	1.000
Not yet industrialized by 1987	284	0.243	0.430	0.000	1.000
Trust	290	0.314	0.131	0.077	0.648
Ethnic fractionalization	290	0.255	0.197	0.012	0.712
Language fractionalization	290	0.195	0.214	0.018	0.807
Communitarian family	284	0.077	0.268	0.000	1.000
Authoritarian family	284	0.173	0.379	0.000	1.000
Egalitarian nuclear family	284	0.493	0.501	0.000	1.000
Absolute nuclear family	284	0.257	0.438	0.000	1.000
Executive constraints	290	5.694	1.520	2.537	7.000
Legal origin (British)	290	0.376	0.485	0.000	1.000
Legal origin (French)	290	0.448	0.498	0.000	1.000
Legal origin (Socialist)	290	0.041	0.200	0.000	1.000
Legal origin (German)	290	0.097	0.296	0.000	1.000
Legal origin (Scandinavian)	290	0.038	0.191	0.000	1.000
Absolute latitude	290	38.048	14.606	1.367	62.000
Corruption	290	1.072	0.937	-0.499	2.353
Rule of law	290	0.967	0.801	-0.649	1.837
Starting business procedure (number)	290	8.771	4.197	2.000	17.000
Ln(1+Starting business time (days))	290	3.327	1.015	1.386	5.056
Ln(1+Starting business cost (% of income per capita))	290	2.060	1.179	0.182	3.960
Ln(1+Enforcing contracts time (days))	290	6.286	0.525	4.796	7.259
Ln(1+Enforcing contracts cost (% of claim))	290	3.131	0.329	2.493	3.704
Ln(1+Paying taxes (# per year))	290	2.741	0.656	1.792	4.143
Ln(1+Paying taxes time (hours per year))	290	5.542	0.831	3.912	7.864
Ln(1+Paying taxes (total tax rate % of profit))	290	3.940	0.354	3.270	4.685
		Sector variables			
R&D intensity	290	2.341	2.461	0.352	11.322
Skill intensity	290	0.278	0.074	0.174	0.484
Capital intensity	290	0.864	0.248	0.481	1.326
External dependence	290	0.711	1.315	-0.322	5.416
Contract intensity	290	0.494	0.180	0.036	0.781
Intangible intensity	290	0.751	1.002	0.020	4.540
Valued added	290	138.375	90.530	62.568	839.952

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