NBER WORKING PAPER SERIES

DYNASTIC MANAGEMENT

Francesco Caselli
Nicola Gennaioli

Working Paper 9442
http://www.nber.org/papers/w9442

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2003

With useful comments by Luigi Guiso, Casey Mulligan, Andrei Shleifer, and Silvana Tenreyro. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

Dyanstic Management
Francesco Caselli and Nicola Gennaioli
NBER Working Paper No. 9442
January 2003, Revised February 2006
JEL No.E1, E2, G1, G3, O1, O4

ABSTRACT

Dynastic management is the inter-generational transmission of control over assets that is typical of family-owned firms. It is pervasive around the World, but especially in developing countries. We argue that dynastic management is a potential source of inefficiency: if the heir to the family firm has no talent for managerial decision making, meritocracy fails. We present a simple model that studies the macreconomic causes and consequences of this phenomenon. In our model, the incidence of dynastic management depends on the severity of asset-market imperfections, on the economy's saving rate, and on the degree of inheritability of talent across generations. We therefore introduce novel channels through which financial-market failures and saving rates affect aggregate total factor productivity. Numerical simulations suggest that dynastic management may be a substantial contributor to observed cross-country differences in productivity.

Francesco Caselli
Harvard University
Department of Economics
Littauer Building
Cambridge, MA 02138
and NBER
caselli@fas.harvard.edu

Nicola Gennaioli
Harvard University
Department of Economics
Littauer Building
Cambridge, MA 02138
gennaiol@fas.harvard.edu

1 Introduction

There is broad agreement that differences in aggregate Total Factor Productivity (TFP) constitute a large fraction of the existing cross-country differences in per-capita income. That is, not only do poor countries have fewer productive resources, such as physical and human capital, but they also employ those resources less effectively than rich countries. The current consensus is that such differences in TFP account for upwards of 50% of income inequality.[1] Naturally, then, attention is increasingly turning to potential explanations for these TFP differences, and various authors have emphasized lags in technology diffusion, geography, vested interests and other institutional failures, and several other causes. We believe, however, that a potentially critical source of inefficiency has so far been largely overlooked by the TFP literature: failures of meritocracy.

Individuals are manifestly heterogeneous in their decision-making skills. Differences across countries in the accuracy with which the best decision makers are selected for important decision-making responsibilities – i.e. differences in meritocracy – can clearly result into differences in the returns countries reap from their productive resources – i.e. differences in TFP. Meritocracy can fail spectacularly in the public sector [e.g. Caselli and Morelli (2002)]. But meritocracy can also fail in the private sector. This paper studies the macroeconomic causes and consequences of an important private-sector non-meritocratic practice: the inter-generational transmission of managerial responsibilities in family firms, a phenomenon that we call dynastic management.[2]

The prevalence of dynastic management is one of the most glaring differences in corporate-governance arrangements between developed and developing countries. In rich countries concentrated ownership and owner-managed firms, particularly when the owner is not the founder, are more the exception than the rule, and managers are usually selected based on their talent and record rather than their ownership status in

[1] See Islam (1995), Caselli, Esquivel, and Lefort (1996), Klenow and Rodriguez (1997), Hall and Jones (1999), Parente and Prescott (2000), Hendricks (2002), and Caselli and Coleman (2005). Caselli (2004) presents a survey and assessment of this literature.

[2] Failures of meritocracy are distinct from the problem of "misallocation of talent" emphasized by Murphy, Shleifer, and Vishny (1991). In the latter, talented individuals maximize the private but not the social return on their abilities. In the former, the talented maximize neither the social nor the private return of their skills.

the firm. In developing countries not only are firms prevalently owned *and* controlled by the members of a family, but ownership *and* control also pass on across generations of the same family. We argue that this systematic difference may be a proximate source of TFP differences: even allowing for self selected initiators of family businesses, as long as managerial talent is not perfectly correlated across generations, assets will sooner or later end up "in the wrong hands," i.e. those of a managerially inept descendant. If most firms in an economy are managed dynastically, therefore, aggregate TFP may be negatively affected.

But why is dynastic management more prevalent in some countries than others? In our model the frictions that give rise to dynastic management are linked to a country's contract-enforcement infrastructure. Untalented heirs of family firms would like to transfer control to new talented owners, or hire talented managers. However, imperfect contract enforcement means that financial markets are underdeveloped, so that it is difficult for potential buyers to obtain financing for the purchase. Similarly, poor contract enforcement makes it difficult for the owner to protect himself from abuse by an outside manager. Since contract enforcement is imperfect, if not entirely lacking, in developing countries, the incidence of dynastic management will be more severe there.[3,4]

[3]To be sure, there are many family-owned and -managed firms also in the rich world, where contract enforcement is reasonably good, and we do not mean to argue that poor contract enforcement is the only cause of dynastic management. In particular, it is likely that members of a family that has historically been associated with a particular firm will derive a sense of identity from continuing in the association (see, e.g., Mann, 1901), and will be more tolerant towards untalented heirs. Another, more benign, view of dynastic management is that it is easier to transmit firm-specific managerial human capital to one's offspring than to outsiders. As we will discuss, the empirical evidence is rather unfavorable to benign views of dynastic management. More to the point, neither "identity" nor firm-specific human capital explain why dynastic management is vastly more prominent in developing countries. Our view is that identity and, perhaps, human-capital issues generate some roughly common non-zero incidence of descendent-operated firms in all countries, but the added mechanism of poor contract enforcement is still needed to give rise to the marked cross-country variation we observe. See Morck and Steier (2005) for further discussions of the historical and political reasons for the ebbs and flows of family capitalism.

[4]Our theory also has implications for the role of rich-country FDI: foreign investors with deep pockets do not need to borrow on local financial markets to take control of badly managed companies. This suggests that, if the trend towards globalization continues, dynastic management may become less of a problem even if contract enforcement remains poor. However, there is another friction that deters FDI: the risk of expropriation by the local government, as recently highlighted by the experience

We study a growth model where dynastic management arises endogenously as a consequence of poor contract enforcement, and look at the consequences of this failure of meritocracy for TFP, capital accumulation, and other macroeconomic variables. A plausible parametrization of our model is able to generate a cross-country dispersion of TFP which is roughly half as large as the one observed in the data. Since the model shuts down by construction *all* of the possible additional sources of TFP differences, this is to be interpreted as the potential explanatory power of dynastic management *alone*.[5] The model also generates large differences in capital-labor ratios, equal to roughly three quarters of the observed ones. This is not only because the lack of contract enforcement deters lending and therefore investment, but also because talented managers invest more than untalented ones, and in the presence of dynastic management many managers are untalented. Combined, the predicted differences in TFP and in capital-labor ratios yield predicted differences in GDP per worker equal to roughly 70 percent of those in the data.

We also perform some comparative static exercises that highlight the key parameters influencing the quantitative importance of poor contract enforcement, via dynastic management, for TFP differences. For example, we find that a higher degree of heritability of a parent's talent dampens the adverse impact of dynastic management on TFP. Essentially, a high degree of inheritability of talent increases the intra-generational correlation between talent and wealth. Since with credit constraints wealthy individuals invest more, a larger fraction of the capital stock is well managed. We also find that changes in the saving rate have an ambiguous impact on TFP: on the one hand, a larger saving rate increases the "cash on hand" of new generations, and talented outsiders can more easily use this cash to buy out untalented heirs to family firms. On the other hand, the same "collateral effect" allows untalented but rich heirs to expand their scale of operation, and thus their profits, which makes them less willing to sell their firms. Finally, larger differences in productivity between talented and untalented managers translate into lower aggregate TFP (relative to the benchmark

of multinationals that invested in Argentina and in Bolovia during the 1990s.

[5]We stress this point because some readers of previous versions of the paper have made the baffling remark that anything short of approximately 100 percent was not "enough," since it failed to explain all of the cross-country variation. Of course it is unthinkable that there would be a single explanation for the entire variation in world TFPs - there would surely be something wrong with our work if we came up with a 100 percent explanation. Indeed, if anything we are more vulnerable to the accusation that 50 percent is *too much.*

of perfect meritocracy) when contract enforcement is very poor: the less able the untalented, the larger the cost of dynastic management. However, for sufficiently large values of contract enforcement, a larger talent gap increases aggregate TFP. This is because a larger talent gap increases the gains from trade between the talented and the untalented, thereby reducing the share of dynastically managed firms.

To sum up, we find that the quality of legal institutions can shape the incidence of dynastic management (and its sensitivity to other economic factors) via two channels. First, poor contract enforcement inhibits the working of the market for firms thus preventing the replacement of untalented managers by talented ones. Second, poor enforcement prevents talented managers from borrowing and expanding their scale of operations. These two effects increase the share of the capital stock managed by untalented managers and adversely impact TFP. As a result, our analysis indicates that poorly functioning legal institutions may importantly shape cross country differences in TFP.

This paper contributes to a small theoretical literature on family firms [Bhattacharya and Ravikumar (2001, 2003), Chami (2001), Burkart, Panunzi and Shleifer (2002), and Almeida and Wolfenzon (2005)]. This literature focuses on the microeconomic causes and consequences of family firms, rather than on their macroeconomic causes and consequences, as here. Nonetheless, our work is closest to Burkart, Panunzi and Shleifer (2002), who – like us – view dynastic management as a second-best response to agency problems (stemming in their case from poor shareholder protection).[6]

In our model one of the reasons why poor contract enforcement leads to dynastic management is that poor contract enforcement impedes financial development. Therefore, we also contribute to the literature on financial development and macroeconomic outcomes, and in particular to that subset of this literature that focuses on the inter-

[6]In Bhattacharya and Ravikumar (2001, 2003) family firms exploit family-specific business skills. Since the family skill is fixed, the return on capital invested in such firms declines as the firm grows and firms reach a "cashing out" threshold (or a professionalization of management threshold in the 2003 paper). The threshold is higher when financial markets are less developed. Chami (2001) views family firms as principal-agent relationships between parent/owner and child/employee. Trust, altruism, and the prospect of succession mitigate the agency problem relative to the situation where the parent hires outside employees [some of these arguments are also in Mulligan (1997, ch. 13).]. Almeida and Wolfenzon (2005) explain why families use pyramidal ownership structures. Contributions in business and sociology also emphasize the importance of shared cultural values and common beliefs in fostering commitment and long run planning (Gersick 1997, Lansberg 1983, Davis 1983). An excellent recent survey of the literature on family firms is Morck, Wolfenzon,and Yeung (2004).

action between heterogeneity of wealth and heterogeneity of innate ability. Hence, our model is close in spirit to Lloyd-Ellis and Bernhardt (2000), though theirs is a qualitative study of patterns of industrialization and inequality, whereas ours is mostly geared to a quantitative assessment of TFP differences.[7] The paper is also complementary to (independent) work of Giné and Townsend (2004) and Jeong and Townsend (2004), who use the wealth-talent-credit constraint interaction to quantitatively explain *time series changes* in TFP (as opposed to cross-country differences, like here) in Thailand. Closest to ours is an independent paper by Quintin (2003), who also focuses on quantifying the ability of imperfect enforcement to explain cross-country differences in aggregate output, the size distribution of firms, and other outcomes in an environment with inheritance of wealth and heterogeneity in talent (though he does not emphasize the inheritance of talent nor TFP differences).[8]

As mentioned above, many authors have proposed possible explanations for cross-country differences in TFP. Our explanation emphasizes misallocation of resources among heterogeneous firms/agents. Independently, Restuccia and Rogerson (2003) analyze a model in which policymakers dish out subsidies that distort the allocation of resources among firms with different productivities, while Burstein and Monge (2005) focus on the choice of talented managers on which countries to operate in.

2 Some Data on Family Firms and Dynastic Management

Our arguments links three well-known facts about developing countries: (i) they have deficient contract enforcement, (ii) they have a high incidence of dynastic management,

[7]There are also important theoretical differences: for example, they do not study the role of the intergenerational transmission of talent; moreover, while they focus on the accumulation of physical capital and on entrepreneurship, we take the level of entrepreneurship (i.e. the number of firms) as given and ask whether the market for corporate control can improve TFP by improving meritocracy.

[8]Other papers studying the wealth-talent-credit interaction include Evans and Jovanovic (1989), who may have been the first to emphasize that credit constraints are especially bad for the *talented* poor; Kiyotaki (1998) who is interested in the possibility that this mismatch leads to cycles; Ghatak et al. (2002), who in a static model stress the possibility of multiple-equilibria; and Cagetti and De Nardi (2002), who try to replicate the US wealth distribution. Also related are the models on intergeneratonal mobility and growth of Galor and Tsiddon (1997), Maoz and Moav (1999), and Hassler and Mora (2000).

and (iii) they have low levels of TFP. We propose that (i) is one of the reasons for (ii) and that, in turn, (ii) is one of the contributing factors to (iii). Fact (i) is documented in a large and growing literature that goes back at least to Knack and Keefer (1995).[9] The higher incidence of family firms in developing countries is one of the key stylized findings of La Porta et al. (1999), who survey the control structure of firms in a sample of 25 countries. Their findings are supported by additional data from Claessens, Djankov, and Lang (2000), as well as from a wealth of easily accessible anecdotal evidence.[10,11]. The low levels of TFP in developing countries are documented in the literature cited in the Introduction.

Historical evidence is also consistent with the idea that contract enforcement and thus financial development as an important influence on the incidence of dynastic management. Becht and DeLong (2004), Morck et al. (2004), and Aganin and Volpin (2004) show how the deepening and broadening of stock markets led to periods of relative decline in the hegemony of families in the US, Canada, and Italy, respectively. But historians have also blamed the greater incidence of family firms for the industrial decline of the UK and France relative to Germany and the US in the early Twentieth Century [Landes, (1969), Chandler (1994)], thereby supporting the view that dynastic management may be a source of economic inefficiency.

This last observation brings us to a key building block of our argument, namely that dynastic successions hurt firm performance on average. There is a growing body of evidence that this is indeed the case. Perez-Gonzales (2001) examines a sample of CEO

[9]Other influential examples include Djankov et al. (2003), Rodrik et al. (2002), and Acemoglu at al. (2001).

[10]For example, *The Economist* reports that family firms generate 70% of total sales and net profits of the biggest 250 Indian (contract enforcement 4.5, TFP 211) private companies (October 5th, 1996). It is trivial to observe that diffuse ownership and/or outside professional management are virtually non-existent in most Sub-Saharan African countries and most of the poorer Latin American ones.

[11]Simple correlations calculated using the available cross country data, reveal a clear tendency for family capitalism to be less prevalent in countries with better contract enforcement. For instance, by regressing the La Porta et al. (1999) country-level measure of family capitalism (fraction of publicly-quoted firms controlled by a single individual among the 20 largest publicly traded companies in each country in 1995) on the Knack and Keefer (1995) "contract enforcement" index, one finds a significantly negative coefficient. Of course, this regression establishes only a simple correlation, but it shows that in the available cross country data the presence of family firms is indeed negatively related to the quality of the legal system. Moreover, the correlation we found in the data is almost certainly likely to underestimate the true one because the sample is skewed towards high to middle-income countries.

transitions in US family firms. He defines a family firm as one where the retiring CEO is related to the firm's founder, and finds that when the incoming CEO is related to the retiring CEO the firm's performance suffers, relative to the case where incoming and retiring CEOs are unrelated. In particular, returns on assets in the "inherited control" cases fall 20% within two years of the new CEO's tenure, while in unrelated transitions they don't change much on average. He also finds that cases where inherited control is accompanied by declines in performance are largely explained by the poor academic record of the inheriting CEO. This suggests – consistent with the view emphasizing problems of managerial quality – that the efficiency losses are linked to the managerial abilities (or lack thereof) of the heir. Villalonga and Amit (2004) reach very similar conclusions.

Similar findings emerge elsewhere in the world. Bennedsen et al. (2005) compare dynastic and non-dynastic successions in Denmark, with a plausible instrumental variable that overcomes selection issues. They find a substantial decline in the return on assets in dynastic cases. Bertrand et al. (2004) look at 70 of the largest business families in Thailand, and find a deterioration of performance after control passes on from the founder to his descendants, the more so the larger the number of family members involved in management. Bloom and Van Reenen (2005) survey managerial practices in the US, UK, France, and Germany. They find substantial cross-country differences in the quality of management, but about half of these differences disappear when they control for the intensity of product market competition and the greater incidence of family firms managed by descendants of the founder. Morck, Strangeland and Yeung (2000) look at a sample of Canadian firms managed by heirs of the founder and find that they under-perform similar US firms with dispersed ownership. Another piece of evidence consistent with the existence of a cost of bundling management and control comes from Volpin (2002). He examines the determinants of executive turnover and firm valuation for all Italian traded companies from 1986 to 1997, and finds that poor governance – as measured both as a low sensitivity of executives turnover to performance, and as a low Q ratio – is more likely when the controlling shareholders are also top executives.[12]

[12]Less direct, but nonetheless relevant evidence comes from Banerjee and Munshi (2002). They show that in the Indian city of Tirupur members of the locally entrenched communal group (analogous to our heirs) operate less efficient firms than non-members (outsiders). Consistent with the view that the persistence of inefficient insiders in business is linked to financial constraints that limit take-overs by outsiders, the average size of the insider-run firms is larger (despite their lower efficiency).

The Morck, Strangeland and Yeung study also contains a macroeconomic version of these tests. Using information from *Forbes 1000* they show that countries in which inherited billionaire wealth is larger with respect to GDP grow less. The opposite holds with respect to the wealth of self-made business entrepreneurs. These results suggest that hysteresis of control along dynastic lines is an important determinant of macroeconomic performance, as postulated in our paper.

3 The Model

3.1 Endowments

We study an economy in discrete time. In each period there is a measure-1 continuum of one-period-lived individuals. A fraction ω of these individuals are inheritors of firms. We call these individuals "the heirs." Formally, we think of a firm as a license to operate a production technology (to be specified below) and sell the output. Hence, heirs are people who inherit such licenses. These licenses are mostly a convenient modelling device to capture the incumbency status of heirs. Nevertheless, licences to run firms are an accurate description of many developing countries (e.g. the Indian "License Raj"). We will typically use the words "firm" and "licence" interchangeably. The remaining $1-\omega$ agents born in each period are the "outsiders."[13]

Whether or not he inherits a license, each agent i may also begin his life with an endowment of b_i units of the consumption good, which we will refer to as "initial wealth."

Finally, each agent i is endowed with managerial talent θ_i, which can be high, θ_H, or low, θ_L. Some heirs are born talented, some untalented, and the same holds true for the outsiders. λ is the economy-wide fraction of agents of type θ_H. We assume $\omega \leq \lambda$ so that inefficiency does not arise trivially for a lack of a sufficient number of talented managers.

[13]Other models of the wealth-talent-credit interaction typically assume entry barriers in the form of a fixed investment cost. In our model, the incumbency status of firms' inheritors could also be captured by introducing a fixed cost of entry and letting the number of firms ω adjust endogenously. However, in order to focus on how contract enforcement affects the working of credit markets and of the market for firms (rather than entry) we take the number of licencies as given [a realistic assumption in developing countries, since entry costs are typically very large there (Djankov et al (2003))]. We return to the issue of barriers to entry in the Conclusions.

The state of the economy at the beginning of each period can therefore be summarized by the joint distribution of three individual-level characteristics: firm ownership status (does the agent own a licence or not), initial wealth b_i, and talent θ_i. We explain how these variables evolve over time in the next few sections.

3.2 Market for Firms

The first set of decisions to occur in any period are buy and sell decisions on the market where outsiders can purchase firms from heirs. As will be seen below, there are two chief reasons for such exchanges of ownership. First, talented individuals generate a greater surplus from running firms than untalented individuals, so there are gains from trade by transferring control from untalented heirs to talented outsiders. Second, individuals with greater initial wealth can make larger physical-capital investments, so there can also be gains from transferring control from low wealth to high wealth individuals in order to expand the scale of operations.

On the market for firms licences are exchanged at price p. For simplicity we assume that each person can own at most one firm - the idea being that of introducing a particularly convenient form of decreasing returns to managerial time. This is similar in spirit to the span of control idea of Lucas (1978). Given this assumption, the demand for firms is the number of outsiders who wish to purchase a license at price p, and the supply is the number of heirs who wish to sell one. We assume that a mechanism leading to market clearing exists, i.e. that in equilibrium p equalizes demand and supply.[14]

3.3 Capital Market and Investment

All individuals have access to a storage technology for their initial wealth, whose within-period return is normalized to 1. In other words, inherited amounts of the consumption good can be stored without loss until the end of a person's life.

Alternatively, initial wealth can be transformed into physical capital, for use in the production of new output, as detailed below. The investment technology is linear: one unit of good invested yields one unit of physical capital. We assume for simplicity that all physical capital is entirely consumed in production within a period. This is not an unrealistic assumption given the non-overlapping generations demography of our

[14]Given that licenses are homogeneous, there is no scope for exchanges of licences among heirs.

economy. Nevertheless, we did perform robustness checks with respect to incomplete depreciation (available upon request) with very modest changes in the results that matter.

Since initial wealth can be turned into physical capital, there is a role for a capital market where firm owners borrow funds from non-owners and invest them. The interest factor on this market is R. Because the storage technology is accessible to all, we must have $R \geq 1$. The capital market meets just after the closing of the market for firms, and R equalizes desired borrowing with desired lending.

In sum, agents who do not own firms can either store their endowment for the period or lend it to firms at the interest factor R. Firm owners have the same two possibilities (storage, and lending to other owners), as well as investing their own wealth into their own firm.[15]

3.4 Labor Market and Production

The third market to meet is a competitive labor market. Labor supply depends on the number of *active* firms, f, where $f \leq \omega$. The number of active firms may be less than the number of licences as some owners may decide not to operate their firms. We assume that all non-owners, and all owners who leave their firm idle (and whose time is therefore not tied up with managerial responsibilities), inelastically supply their unit labor endowment. Hence, labor supply is $1 - f$. Labor demand is expressed by active firm owners, who take the market-clearing wage w as given.

Next, the economy turns to production. Each firm i combines the capital it installed, K_i and the labor it hired, L_i to produce output according to the production function:

$$Y_i = A_i K_i^{\alpha} L_i^{1-\alpha}.$$

The key assumption is that the efficiency level A_i reflects the ability of the owner: if the owner is talented then $A_i = \theta_H$, if he is not, then $A_i = \theta_L$.

Owners are residual claimants to income net of wage payments, which we (improperly) call "profits," and denote by π_i.[16]

[15] Agents who do not own firms never invest in physical capital because they would then lack a license to operate it.

[16] Implicitly we assume that labor input is homogeneous, i.e. talent only matters for managerial tasks. It would be trivial to extend the model to have two labor types, and doing so should enhance the impact of dynastic management on TFP. Intuitively, having two labor types implies a lower wage

3.5 Enforcement

At the end of the period, those who borrowed on the capital market owe funds to lenders. Furthermore, some of the purchases of firms may also have been externally financed. Thus, debtors must now decide whether or not to repay their debts. We assume that courts in this economy have the ability of seizing a fraction ϕ of the resources of a party in violation of contractual commitments, such as a debtor who fails to repay the creditor in full. If $\phi = 1$, then enforcement is perfect. Default decisions will clearly depend on ϕ, which is therefore our key parameter describing the efficiency of contractual enforcement.

3.6 Inter-Generational Dynamics and Objective Functions

We introduce two sources of inter-temporal linkages. The first is a bequest motive, and the second is a mechanism for the inter-generational transmission of abilities. One could say that the first regulates the inter-temporal transmission of physical capital, and the latter of human capital.

Each agent engages in asexual reproduction of one offspring, who will live next period. If an agent owns a firm, he bequeaths the licence to the offspring. Whether or not an agent owns a firm, he also bequeaths to his offspring a fraction γ of any wealth he owns at the end of his life (and consumes the rest). Hence, our bequest behavior is akin to a constant saving rate *á la* Solow (1956). Finally, the offspring of an untalented agent is untalented with probability η_L, and the offspring of a talented agent is talented with probability η_H. Each agent's objective is to maximize current income. Because of computational constraints our behavioral assumptions are necessarily simplistic, but we believe that more sophisticated consumption-bequest decisions would not significantly affect our results.

3.7 Market for Managers

In Appendix A.1 we further extend this model to a situation where – as an alternative to selling the firm – untalented firm owners can transfer control by hiring a talented manager. We show that this extension does not change our results. The reason is that manager-owner relationships are also generally more or less viable, depending

for the untalented, and hence less of an incentive for untalented heirs to sell their firms. We expect this effect to be small.

on the quality of an economy's contract-enforcement infrastructure. Countries where the courts have a difficult time enforcing debt contracts, will also have a difficult time providing managers with the incentives not to steal a firm's profits – if not its assets – from the owner-principal. Hence, when one solution (transfer of ownership) is unfeasible, so is the other (hiring a manager).

4 Equilibrium Analysis

In this section, we highlight the key behavioral and equilibrium relationships of our model. The model is best analyzed by backward revisiting the various stages of economic life laid out above, starting with the labor market and production.

4.1 Output, Wages and Profits

Since agents maximize income, firm owners seek to maximize profits, which are given by $\pi_i = A_i K_i^a L_i^{1-\alpha} - wL_i$, taking the wage w as given. Aggregating over all firms' demand functions labor demand turns out to be

$$L^d = \left(\frac{1-\alpha}{w}\right)^{\frac{1}{\alpha}} \left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right] K,$$

where K is the aggregate capital stock ($K = \int_i K_i di$), and s is the fraction of the aggregate capital stock in firms run by talented managers [$s = \int_{i;A_i=\theta_H} (K_i/K) di$]. We will sometimes refer to s as an index of "meritocracy." Clearly, the term $(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}$ is a measure of the average efficiency in the economy.

Setting labor demand equal to labor supply $1-f$, we can solve for the equilibrium wage:

$$w = (1-\alpha)\left(\frac{K}{1-f}\right)^{\alpha} \left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right]^{\alpha}. \tag{1}$$

Intuitively, the wage depends on the aggregate capital-labor ratio, $K/(1-f)$, and on the way the capital stock is distributed between talented and non-talented owners: the greater s, the greater the overall efficiency of the economy, the higher workers' wages.

Plugging the firm's labor demand and the wage functions in the expression for the firm's output, and aggregating across firms, we obtain aggregate GDP per worker:

$$\frac{Y}{1-f} = \left(\frac{K}{1-f}\right)^{\alpha} \left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right]^{\alpha}, \tag{2}$$

where $Y = \int_i Y_i di$. This illustrates the nice aggregation properties of the model: despite the existence of arbitrary heterogeneity in the firm distribution of capital and efficiency, aggregate output can be decomposed into the contributions of capital intensity, $K/(1-f)$, and a "TFP" term, $\left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right]^{\alpha}$. This will be useful when assessing the quantitative predictions of the model against cross-country evidence on TFP differences. Even more importantly, the meritocracy index s entirely determines TFP, and is therefore the endogenous variable of greatest interest in this paper.

Firm i's profits $Y_i - wL_i$ are given by

$$\alpha \frac{A_i^{\frac{1}{\alpha}}}{\left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right]^{1-\alpha} K^{1-\alpha}} K_i \equiv \pi\left(A_i\right) K_i. \tag{3}$$

Profits increase linearly in firm's size, K_i. Profits per unit of installed capital, $\pi(A_i)$, are increasing in managerial talent A_i, and decreasing in meritocracy s and the aggregate capital stock K. The latter two effects are mediated by the wage: the larger K and s, the higher the wage, the lower the profits left over for firm owners' to collect. Hence, individual owners prefer to compete against untalented rivals.

4.2 Borrowing, Lending, and Investment

Borrowing, lending, and investment take place after the meeting of the market for firms, so the ownership status of agents is known. Consider then the situation of an outsider i, with talent A_i and initial wealth b_i, who has acquired a licence at price p. If he operates a firm of size K_i his life-time income is

$$\pi(A_i)K_i - R[K_i - (b_i - p)]. \tag{4}$$

In words, he earns profits $\pi(A_i)K_i$, out of which he repays any debts. Since his net worth is $(b_i - p)$, his indebtedness is $[K_i - (b_i - p)]$.[17] If one sets $p = 0$, then (4) represents the income of a heir who did not sell his licence.

The income equation shows that the owner's choice of physical capital will typically feature a corner solution: if $\pi(A_i) > R$ the owner borrows as much as he can, while if $\pi(A_i) < R$ he does not operate the firm and lends his net worth on the capital markets (or store it, if $R = 1$). Only if $\pi(A_i) = R$ he is indifferent about the amount he borrows.

[17] If $K_i < b_i - p$ the agent is a lender, and the second term in the income equation is interest income.

Consider then the case $\pi(A_i) \geq R$. How much is the owner allowed to borrow? This depends on the borrower's incentive to default. If the borrower defaults, his income is $(1-\phi)\pi(A_i)K_i$: default allows the debtor to avoid debt-service charges, but incurs him a proportional cost ϕ associated with foreclosure. Incentive compatibility requires that this quantity is no larger than the quantity in (4), which is the borrower's income if he does not default. Comparing the two expressions we see that incentive compatibility is not binding if $R \leq \phi\pi(A_i)$. We rule out this case below. If instead $R > \phi\pi(A_i)$, the maximum scale of operations the owner can reach is:

$$K(A_i, b_i) = \frac{R(b_i - p)}{R - \phi\pi(A_i)}. \tag{5}$$

The function $K(.)$ represents an owner's "capital capacity." Capital capacity increases more than one-to-one with the owner's initial wealth, as b_i also operates as a basis for leverage. The larger the initial wealth of the owner, the more he stands to lose from defaulting, the more he can borrow from others - a well known property of models with imperfect credit markets. Capital capacity is also larger for talented owners: since they earn larger profits, they have more to lose from defaulting. The macroeconomic variables that adversely affect capital capacity are R, because an increase in R increases the amount of debt to be serviced and thus the incentive to default; p, which reduces the borrower's net worth, and with it his capacity to borrow; and K and s, which lower profits and hence the cost of default. Notice that, ceteris paribus, the dependence on p implies that heirs are able to borrow more than buyers of firms.[18]

Substituting for K_i in (4) and rearranging we get that the life-time income of an owner who decides to run his company is

$$\frac{R(1-\phi)\pi(A_i)}{R - \phi\pi(A_i)}(b_i - p). \tag{6}$$

The next question we must address is whether an owner will indeed choose to operate his firm. An alternative strategy would be to let the firm idle (i.e. forego using the

[18] A more accurate statement of an owner's capital capacity is

$$K(A_i, b) = \max\left[\frac{R(b_i - p)}{R - \phi\pi(A_i; K, s)}, 0\right].$$

To see why capital capacity is zero when $b_i < p$ notice that a borrower with none of his own wealth invested would surely default, as $R > \phi\pi(A_i)$. But only individuals with positive net worth $b_i - p$ can invest some of their own wealth. The reason why the statement in the text is accurate is that individuals such that $b_i < p$ never buy firms, so this case never arises. Individuals with $b_i < p$ never buy firms precisely because their capital capacity is zero, so they have nothing to gain from doing so.

licence), lend his net worth, and join the labor market. We already know that, if $\pi(A_i) < R$, the owner always chooses this path. But he could also choose it if it provided life-time income greater than the life-time income associated with running the firm. His life-time income from not running the firm is $w + (b_i - p)R$. Comparing this with (6) we see that an owner operates his firm if and only if

$$w \leq \frac{\pi(A_i) - R}{R - \phi\pi(A_i)} R(b_i - p). \tag{7}$$

Hence, wealthier and more talented owners are more likely to operate their firms. Also, more owners will choose to operate their firms if the wage (i.e. K and s) and the interest factor are low.

Given the foregoing observations, we can now introduce some general-equilibrium considerations. First, there are no equilibria where $\pi(\theta_H) \leq R$. For, in this case, no owners would wish to operate their firms [as $\pi(\theta_H) \leq R$ implies $\pi(\theta_L) < R$], and the aggregate capital stock would be zero. But $\pi(\theta_H)$ - the revenue for unit of capital invested - goes to infinity as K goes to zero, leading to a contradiction. Second, in equilibrium $R > \phi\pi(\theta_H)$; otherwise, firm owners have an infinite borrowing capacity and, given $\pi(\theta_H) > R$, demand for capital would also go to infinity. This triggers an upward adjustment in R. Note that since $\phi\pi(\theta_H) < R$ then also $\phi\pi(\theta_L) < R$.

We can summarize this discussion as follows. In equilibrium, talented firm owners whose net worth exceeds the one implicitly defined in (7) operate their firms. Their scale of operations is given by their capital capacity $K(\theta_H, b_i)$. Low net worth talented owners leave the firm idle, earn R on their wealth, and sell their services on the labor market. If $\pi(\theta_L) < R$ all untalented firm owners shut down their firm, lend or store their wealth, and join the labor force. If $\pi(\theta_L) > R$ untalented firm owners behave as talented ones: those with sufficient net worth operate their firm at maximum capacity, while the others leave the firm idle, lend or store their wealth, and earn wage income. The total demand for funds on the capital market is the sum of the capital capacities of all the owners who decide to operate their firms. If this aggregate capital capacity is less than the aggregate net worth, then the equilibrium features $R = 1$, and lenders are indifferent between lending and storing. (For, if the interest factor was greater than 1, lenders would compete to lend, driving the interest factor down.)[19]

[19] In other words, the supply of capital is a step function, equal to 0 for $R < 1$, equal to the aggregate net worth of the economy for $R > 1$, and equal to anything in between for $R = 1$. The demand for capital is the total capital capacity of active entrpreneurs, and is downward sloping.

4.3 Market for Firms

We can finally step back to the most interesting market in this economy, where firms' ownership is determined. On the supply side of this market, each heir i decides whether to keep or sell his firm. If he keeps the firm and subsequently operates it, his income is given by (6) (with $p = 0$). If instead he sells his license, his income is $w + (b_i + p)R$. Comparing these two options, and rearranging, the set of heirs i who wish to sell their license is given by:

$$w \geq \frac{\pi(A_i) - R}{R - \phi\pi(A_i)} Rb_i - Rp. \tag{8}$$

Hence, higher R, p, K, and s increase the supply of firms. Also, less talented and poorer heirs are more likely to sell.[20]

On the demand side there are talented and untalented outsiders. An outsider i will compare (6) (his income if he buys) with $w + Rb_i$. Hence, buyers are identified by the condition:

$$w \leq \frac{\pi(A_i) - R}{R - \phi\pi(A_i)} Rb_i - \frac{R(1-\phi)\pi(A_i)}{R - \phi\pi(A_i)} Rp. \tag{9}$$

Higher K, s, R, and p reduce the demand for firms. Furthermore, more talented and richer outsiders are more likely to be seeking to purchase firms.

Conditions (8) and (9) embody a number of important properties of the model. First, the conditions under which an outsider wishes to buy a license are more stringent than the conditions under which a heir wishes to keep the firm. In other words, the average buyer is richer and more talented than the average keeper.[21] This is because outsiders have to pay price p in order to buy their firm. Second, exchange of firms may happen for two reasons. (i) Untalented heirs may transfer control to talented outsiders who maximize the firm's productivity. (ii) Poor insiders may sell their firms to rich outsiders who expand the scale of operations. Third, and most important, when $\pi(A_i) > R$ better enforcement (a higher ϕ) increases the value of running a firm, reducing firm owners' incentive to sell, and increasing outsiders' incentive to buy. Yet, equations (8) and (9) imply that this effect is asymmetric for talented and

[20] Condition (8) is derived assuming that heirs compare their payoff from selling with their payoff from keeping *and using* the license. It is clear that all those who would not use the license should they remain in possession of it, will try to sell it irrespective of the price p. Hence, a subset of the sellers is identified by condition (7). However, condition (8) is less stringent than condition (7), so it completely describes the set of sellers.

[21] Notice that in the relevant case $\pi > R \geq 1$ the quantity multiplying Rp in (9) is greater than 1.

untalented people. Ceteris paribus, a higher ϕ renders talented heirs relatively less willing to sell and talented outsiders relatively more willing to buy. Thus, absent wealth heterogeneity, improvements in ϕ lead to greater meritocracy. However, if agents start their lives with different wealth levels, better contract enforcement may allow untalented but rich agents to leverage their wealth to such an extent that they are more willing to own firms than talented agents. It is the correlation between wealth and talent that determines the impact of financial development on meritocracy.

We conclude this section with general equilibrium observations that are useful in solving the model. If the price p is positive then there can be no idle firms: their owners would sell them. Conversely if there are idle firms, i.e. heirs who wish to sell but were not able to find a buyer, then it must be the case that $p = 0$.[22]

4.4 Equilibrium

The search for an equilibrium in any given period proceeds as follows. We start with a proposed set of equilibrium values for p, R, f, s, and K. Given f, s, and K we compute w from (1), and $\pi(\theta_H)$ and $\pi(\theta_L)$ from (3). With these values, as well as with p and R, we use (8) to classify all heirs into keepers and sellers. The sum of the sellers is the supply of firms. We use (9) to identify all outsiders who wish to buy a firm, which gives the demand for firms. If the supply of firms exceeds the demand (a situation that can be an equilibrium only when the price p is 0), the unsold firms are idle, and involuntary keepers are drawn randomly from the population of aspiring sellers. This generates f', or the number of active firms implied by the proposed set of solution values. Also, given the new ownership structure determined on the market for firms, the demand for capital K' is the sum of the capital capacities of all the owners, (5), and the implied level of meritocracy s' is the fraction of this that accrues to talented owners. We have found an equilibrium if $f' = f$, $K' = K$, and $s' = s$.

Once we find an equilibrium, we calculate firm ownership-status and the end-of-period wealth of all the agents. We then use our assumptions on the intergenerational transmission of wealth and talent to determine the next period's initial distribution of

[22]This discussion has not taken into account the possibility that the buyer defaults on the purchase price p. The reason why there is no incentive compatibility constraint is that, as we argued in footnote 18, and is also implied by (9), only outsiders i such that $b_i > p$ buy firms. Hence, there is no loss in generality in assuming that all purchases of licences are financed by direct out of hand payments from buyer to seller.

wealth, ownership status, and ability.

We do not have generic proofs of existence and uniqueness of the equilibrium, but in our simulations we have encountered no instances where an equilibrium did not exist. Also, our simulations attempt to find all possible equilibria. Again we have encountered no instances of multiplicity.

5 Calibration

The parameters required to simulate the model are α (production function), θ_H/θ_L (relative TFP of well run firms), ω (number of licences per person), λ (percent of agents who could make a good manager), η_L and η_H (probability of inheriting one's parent talent), γ (generosity of bequest, or saving rate), and of course our key enforcement parameter ϕ. Our goal is to assess the quantitative importance of variation in ϕ. Hence, we proceed as follows. First, we identify the empirically relevant range of variation for ϕ. Then, we choose all other parameters so that the model is consistent with US macro- or micro-economic statistics. Finally, holding all these other parameters constant, we look at predicted values of TFP, and other outcomes, in countries with lower ϕ. The idea of course is to isolate the effect of contract enforcement on efficiency in economies that are otherwise identical.

Identifying the empirically relevant range of variation for ϕ is relatively straightforward. In the US, and perhaps in a few other rich economies, contract enforcement simply works. As a result, most viable (positive NPV) projects are financed and implemented.[23] A piece of evidence on the value of ϕ in rich countries is provided by Franks and Torous (1994), who find that deviations from absolute priority in favor of equity holders in distressed exchanges and Chapter 11 reorganizations (a concept akin to $1-\phi$ in our model) are well below 10 percent on average. To be conservative, we set the US value of ϕ to 0.9. In practice, it turns out that for most macroeconomic outcomes the quantitative predictions of the model become insensitive to the particular value of ϕ for $\phi \geq 0.5$, so the choice of ϕ at the high end is not particularly critical. At the other end of the contract-enforcement spectrum, there are obviously many countries whose judicial system is so inefficient and corrupt that contract enforcement is virtually non-existent. Hence, we argue that the empirically relevant lower bound for

[23]For example, Hurst and Lusardi (2004) find that in the U.S. entry in entrepreneurship is independent of initial wealth. This result is clearly at odds with a severe credit constraint on entrepreneurs.

ϕ is around 0.

For the parameters α and γ it is fairly easy to identify plausible values (or intervals). The production function parameter α is the share of capital *and entrepreneurial effort* in income. It thus includes all of capital income plus the share of labor income that accrues to the top management. Cooley and Prescott (1995) set the capital share at 0.4. It is hard to pin down the managerial share of labor income exactly, so we add ten percent and set $\alpha = 0.5$. For the bequest parameter γ we chose a benchmark of 0.3, which is an historically plausible figure for the saving rate. Needless to say, we will present extensive robustness checks to these and the other parameter choices.

For the number of licenses ω we use the strategy of matching moments from the model to moments from the data. In particular, we choose ω so that, conditional on all other parameter choices, the model's steady state number of *active* firms per person f equals 0.04, which is the number of firms in the US as a percent of the labor force according to the US Census' web site.

Next we turn to the inheritance parameters η_H and η_L. We choose these two numbers so as to match two statistics that are (somewhat) easier to think about. The first is the intergenerational correlation of managerial talent, q. The second is the fraction of managerially-talented individuals, λ. In the appendix we show how, in order to replicate an intergenerational correlation of talent, q, while at the same time maintaining a constant share λ of talented individuals in the population, η_H and η_L must be, respectively

$$\eta_L = 1 - \lambda + \lambda q \tag{10}$$

$$\eta_H = \lambda + q - \lambda q. \tag{11}$$

The question is now one of choosing q and λ. For q, we use estimates of the intergenerational correlation of IQ. We do not mean to suggest that managerial talent is synonymous with IQ, but we think it is plausible to assume that IQ and managerial talent follow similar rules of intergenerational inheritance. In the Appendix we review the psychological literature on the persistence of IQ, based on which we set our benchmark value for q at 0.40.[24] This choice clearly abstracts from (at least) two powerful intuitions about the inheritance patterns of managerial talent. On the one hand, one may expect that heirs will absorb firm-specific human capital by interacting with their parents. This suggests a larger value of q than the one for IQ. On the other, heirs of

[24]Interestingly, a similar figure is obtained by Solon (1992) and Zimmerman (1992) as an estimate of the intergenerational correlation of income.

family firms are often deemed to suffer from the "Carnegie effect," according to which inherited wealth "deadens the talents and energies of the son, and tempts him to lead a less useful and worthy life than he otherwise would."[25] This suggests a lower value of q. The reader will no doubt have these effects in mind when we present our robustness checks to alternative values of q.

Turning now to λ, or the share of the population that can successfully run a business, we cannot rely on "off the shelves" estimates, because managerial talent is hard to measure. In addition, for economies with good contract enforcement, our model's predictions for the key observable macroeconomic aggregates are independent of λ. Indeed, to anticipate one of the key bresults below, for $\phi \geq 0.5$ all firms are run by talented managers (at least as long as $\lambda \geq \omega$). As a result, we cannot calibrate λ to match some U.S. benchmark. However, we reason as follows. In an economy with low entry barriers like the U.S. [Djankov et al. (2003)], talented managers are unlikely to be prevented from using their talents by entry regulations (which would potentially be the case if $\lambda > \omega$). If they are prevented from operating firms it must be because it is endogenously optimal to have fewer than ω firms operating, or because contract-enforcement imperfections (as opposed to regulatory constraints on the number of firms, which is not the focus of this paper) keep some firms in untalented hands. This considerations imply that $\lambda = \omega$, i.e. that the number of people who could effectively run a firm does not exceed the number of available licenses. As a result, in our benchmark calibration we set $\lambda = \omega$. Later, we show that our simulations are robust to alternative values of λ.

For θ_H/θ_L we rely on Perez-Gonzales' (2001) estimate that dynastic successions in the US lead to an average decline in the return on assets of 20 percent. We use this number by reasoning as follows. First, to anticipate one of our results below, under virtually any combination of parameters a country with $\phi = 0.9$ – which we argued is the case for the US – will have only talented owners, or $s = 1$. This implies that all successions are from a high level of talent in the previous generation. Next, we imagine that the offsprings of the previous CEO "try out" as CEOs for a few years. This is the stage when they are observed by Perez-Gonzales, who picks up the lack of talent among some of them. Subsequently, those who under-perform transfer control to someone talented (but not before their underperfomance provides us with

[25] Bill gates has expressed similar concerns, and a large number of American billionaires have publicly opposed President Bush's plan to eliminate estate taxation on similar grounds.

the information needed to calibrate θ_H/θ_L). Given these assumptions, the average change in the return on assets after a dynastic succession is $(1-\eta_H)[1-\pi(\theta_L)/\pi(\theta_H)]$, or the percentage $(1-\eta_H)$ of untalented heirs times the drop in performance associated with the fall in talent. Using (3) and the Perez-Gonzales estimate this boils down to

$$\frac{\theta_L}{\theta_H} = \left(1 - \frac{0.2}{1-\eta_H}\right)^{\alpha}.$$

The set of benchmark values resulting from this calibration strategy is reported in Table 1.

α	θ_H/θ_L	ω	η_h	η_l	γ
0.5	1.33	0.10	0.46	0.94	0.3

Table 1: Data and Implied Estimates of MPK and $PMPK$

We simulate the dynamic evolution of an economy populated by 5000 individuals. We randomly generate a period-0 distribution of initial wealth across them using a uniform distribution on the $[0, 0.25]$ interval. We randomly assign a talent (low or high) and an ownership status (yes or not) to the first generation of agents. Both initial talent and ownership status are drawn from binomial distributions with parameters λ and ω, respectively. Given these initial conditions, we observe the evolution of the economy for our benchmark calibration, for a variety of values of the enforcement parameter ϕ. For each value of ϕ we let the economy evolve over 30 periods (generations), though in practice all of the endogenous variables seem to settle down to "steady state" values after 5 periods or so. We report such steady state values for the endogenous variables as averages over periods 10 to 30.

6 Results

6.1 Benchmark Parameter Values

Our benchmark results are depicted in Figure 1. The endogenous variable of greatest interest in this paper is TFP, i.e. the quantity $\left[(1-s)\theta_L^{\frac{1}{\alpha}} + s\theta_H^{\frac{1}{\alpha}}\right]^{\alpha}$. The steady state value of TFP is plotted in panel (a) against 10 possible values of ϕ between 0 and 0.9 – the empirically relevant range as discussed in the previous section. TFP is

(weakly) upward sloping, indicating that improvements in contractual enforcement lead to improvements in governance. The relationship levels off for $\phi = 0.5$, because at this value and above it becomes possible for all inept owners to sell their firms.

Quantitatively, the effect of ϕ is large: the economy with the poorest enforcement has TFP levels as low as 60 percent of the TFP of the most efficient economy. Hence, we conclude that the model can account for a 40 percent TFP gap between the most efficient and the most inefficient economy, *due to dynastic management alone*. In a 93-country data set for the year 1996, the 10th percentile of the TFP distribution is computed to be about 30% of the 90th percentile [Caselli, 2004]. Hence, the fraction of the observed TFP gaps potentially explained by the model is $40/70 = 0.57$. Since we have shut down all other possible sources of TFP differences we regard this as a very large effect.

In our model there are two mechanisms through which improved contract enforcement reduces the inefficiencies caused by dynastic management. First, on the market for control, more untalented heirs sell their licenses to talented outsiders. Second, on the capital market, talented managers can expand their operations through borrowing relatively more than untalented ones. Both mechanisms result in an increase in the relative amount of capital in the hands of talented individuals. To gauge the relative importance of these two mechanisms we have simulated an alternative version of the model where there is no market for control: licenses always stay with the initial owner. The steady state TFP level of this economy is plotted in Panel (b). It seems clear that the market for control is at least as important as the capital market in determining the long-run aggregate efficiency of the economy: even with almost perfectly efficient capital markets (or $\phi = 0.9$), in the absence of a market for control TFP is only 85 percent of what it would be with a market for control.

The role of contract enforcement in facilitating transfers of control is further underscored by Panel (c), which plots the fraction of active firms that change owner in an average period in steady state, always against ϕ. Here we observe a steep rise in the fraction of firms changing hands as ϕ increases. When we looked at the identity of buyers and sellers we found that all buyers were talented and all sellers untalented, so all sales are motivated by differences in talent, as opposed to differences in wealth.

In the remaining panels of Figure 1 we document the implications of our model for a variety of additional macroeconomic variables of interest. In line with standard predictions from growth models under imperfect credit markets, the amount of capital

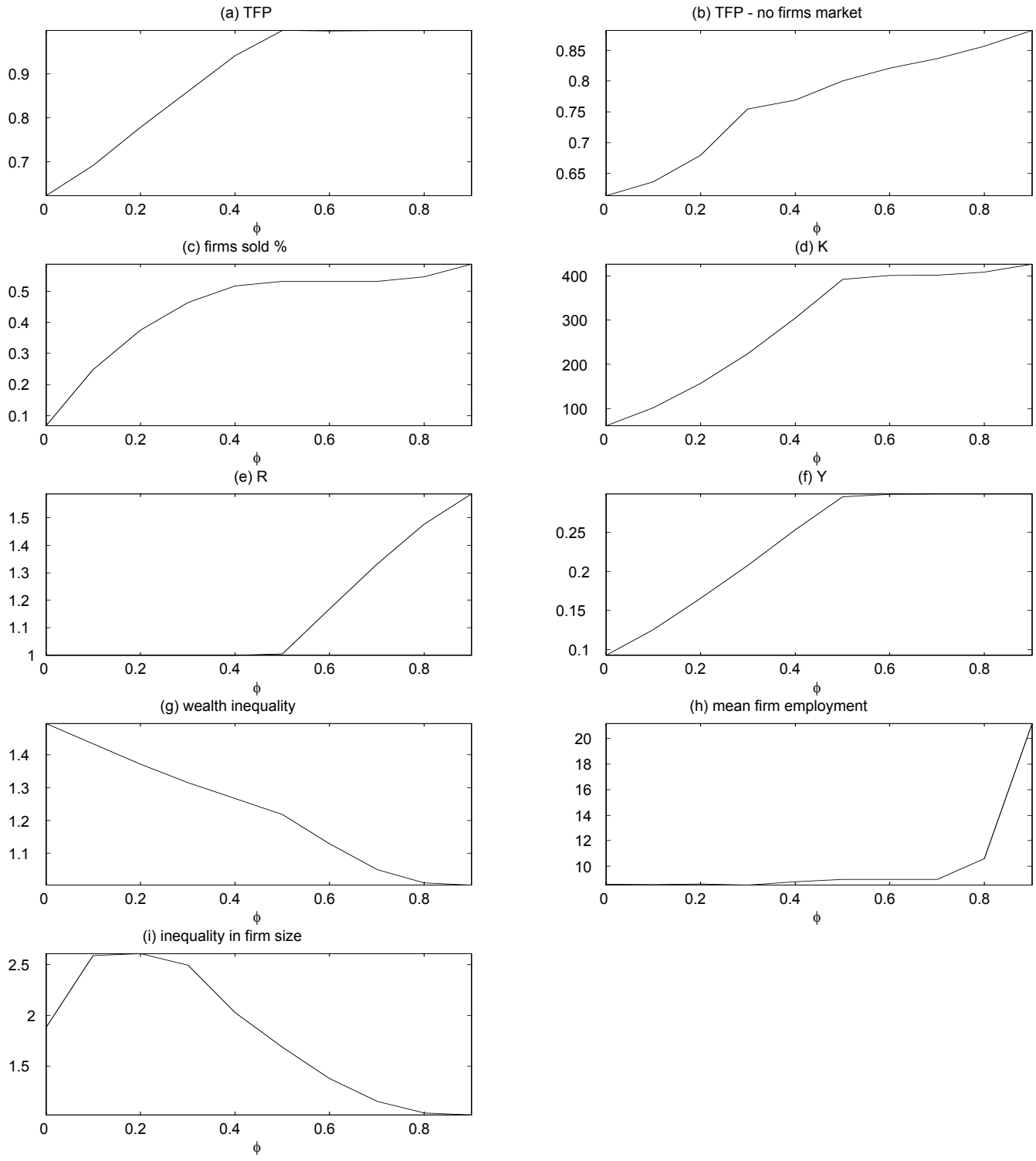

Figure 1: Benchmark Results

in use in firms, K, is strictly increasing in contract enforcement, and the quantitative impact of ϕ on capital accumulation is large [Panel (d)]: the lowest-highest gap is about 75% of the $10_{th}-90_{th}$ percentile gap in the data. While credit constraints would tend to reduce capital accumulation in any growth model, in the current version their adverse effect is boosted by the heterogeneity in talent. We quantify the extra effect of talent heterogeneity in subsection 6.4 below. Panel (e) shows the interest factor, R. For low values of ϕ the aggregate "capital capacity" of firms in this economy is small, as potential lenders are weary of default. Hence, only a fraction of the overall liquid wealth with which every period begins is transformed into physical capital and the interest-factor is anchored to the rate of return on the storage technology ($R = 1$). For ϕ large enough, however, the capital capacity of firms becomes sufficiently strong to absorb the entire liquid wealth, and competition for finance drives up the interest rate ($R > 1$). Hence, as in other models of financial imperfections, interest rates are not necessarily higher in countries with a high physical marginal product of capital.[26] Coming back to Panel (d), this reasoning also explains the kink in the profile of K against ϕ.[27]

Bringing together our predictions on TFP and the capital stock, Panel (f) shows that per capita GDP, the measure of welfare in our economy, increases monotonically in ϕ. The quantitative impact of financial development, which combines the separate effects of ϕ on TFP and investment, is large, as the country with the worst contract enforcement has about 0.3 of the per capita GDP of the country with the best contract enforcement. The 90_{th}-10_{th} interpercentile ratio in the data is 0.05, suggesting that by merging dynastic management with factor accumulation effects allows credit frictions to explain about 0.7/0.95=73 percent of the observed per capita income gap.

In Panel (g) we plot steady state wealth inequality – as measured by the ratio of mean to median end-of-period liquid wealth b_i – implied by the model for different values of ϕ. Consistent with empirical evidence the relationship is negative (better contract enforcement implies less inequality). In financially underdeveloped (i.e. low

[26] Caselli and Feyrer (2005) present evidence on the divergence between physical marginal products and financial rates of return across countries.

[27] Castro, Clementi, and McDonald (2004) find that better investor protection may *reduce* capital accumulation by lowering the income of the (young) entrepreneurs, who have to give a larger share of profits to the (old) investors. In our model it is also true that a higher ϕ maps into higher interest rates, with a potentially negative effect on the demand for capital. However, in our model the benefit of relaxing the incentive compatibility constraint with a higher ϕ dominates the Castro et al. effect.

ϕ) countries, owners enjoy large rents and wages are low, while with financial development rents decline and wages grow.[28] Also consistent with empirical evidence is that richer countries have larger average firm size in terms of workers (or, equivalently, the number of firms per capita is declining in ϕ), as shown in Panel (h).[29] Finally, as depicted in Panel (i), inequality in firm sizes is inverted-U shaped in ϕ: countries with intermediate values of contract enforcement exhibit the biggest spread between the mean and the median firm. Indeed, when ϕ is very low borrowing is limited and firms' dispersion is bounded by the distribution of initial wealth; when ϕ is large wealth does not matter for investment and talented managers run equally sized firms. When ϕ is intermediate, contract enforcement is not good enough to induce all untalented heirs to sell but it still allows firm owners to leverage their wealth and expand the scale of operation. In this range credit markets magnify the differences between the size of the firms owned by rich/poor and/or talented/untalented agents, leading to the inverted-U shaped relationship between firm size dispersion and aggregate TFP.[30]

6.2 Effects of Inheritability of Talent

In Figure 2 we begin probing the robustness of our results to deviations from our benchmark calibration, starting with the most interesting case in the context of dynastic management, i.e. the talent-inheritance parameter, q. Figure 2, as all subsequent figures, reproduces the same information as Figure 1, but adds results for various deviations from the benchmark calibration. Hence, for example, in Panel (a) we look at TFP as a function of ϕ for 5 possible values of q: 0 (corresponding to i.i.d. talent draws), 0.4 (our benchmark), 0.6, 0.8, and 1 (corresponding to perfect intergenerational transmission of talent).

Our simulations show that a high degree of heritability of talent pushes the economy towards greater efficiency: for any level of ϕ, steady state TFP is (weakly) larger at higher values of q. The mechanism that makes dynastic management less of

[28] See Cagetti and De Nardi (2002) for another model were better enforcement leads to less inequality.

[29] This is the main focus of Quintin (2003).

[30] Also inverted-U-shaped is the relationship between the market price of firms and ϕ (not plotted for reasons of space). A larger ϕ increases the demand for firms by increasing the ability of talented outsiders to buy, but it also favors the concentration of the existing capital in the hands of talented heirs, thus inducing untalented ones to sell. This last effect increases the supply of firms and dominates the first one when ϕ is large enough.

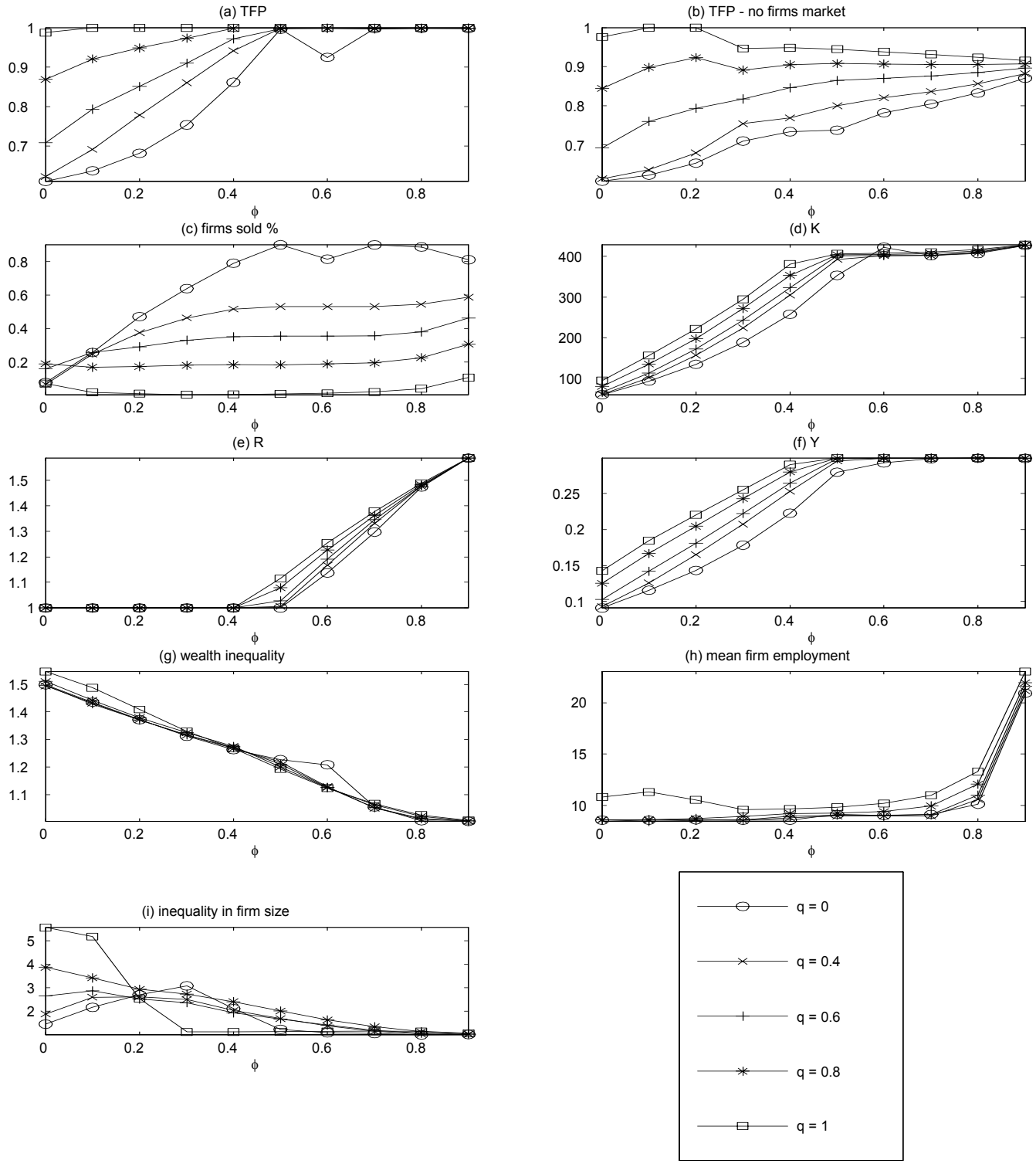

Figure 2: Variation in the Inheritance of Talent

a problem with high talent inheritability is simple. In every period talented managers make higher profits and bequeath larger assets. A high intergenerational correlation of talent increases likelihood that their offsprings are talented as well, thereby increasing the correlation between talent, wealth, and firm ownership. This high positive correlation between talent, wealth, and ownership implies that the markets for control and for capital play less critical a role in efficiently allocating ownership and assets. In Panel (c) we show that reallocation of ownership does indeed decline as q increases.[31]

6.3 Effects of the Saving Rate

We next consider the effects of variation in the saving/bequest rate γ (Figure 3). Because γ governs the dynamics of the wealth distribution, and because the wealth distribution affects the outcome in the market for firms, it is possible that γ will exert a direct causal impact on TFP. On the market for control, there are two opposing effects at play. On the one hand, a higher γ increases the size of the bequests received by talented outsiders, thus facilitating their purchases of firms. On the other hand, a higher γ increases the persistence of liquid wealth across dynastic lines, thus making more likely that rich but untalented heirs hold on to managerial responsibilities. Panel (c) shows that these effects lead to some nonmonotonicity in the relationship between γ and the amount of ownership changes, though quantitatively the net effect is modest.

On the market for capital, the saving rate affects the allocation of capital towards talented agents, and hence TFP, mainly through a general equilibrium effect mediated by the interest rate. A lower saving rate implies a dimished supply of capital [Panel (d)] and hence a higher interest rate [Panel (e)]. A higher interest rate hurts untalented agents because the talented ones can afford to pay a higher interest rate, so it tends to reallocate capital towards the latter. Also, the smaller the saving rate, the smaller the impact on a dynasty's current investment of incomes it earned far in the past. Thus, dynasties that were untalented one period ago (and are thus very likely to be untalented today as well), are going to invest very little in the current period.

[31] The nonmonotonicity in the graph for TFP for $q = 0.5$ is due to a numerical aberration: for $\phi = 0.6$ there happens to be a dynasty that accumulates a disproportionate amount of wealth [see panel (h)], and this dynasty happens to have several untalented draws, which means that a significant amount of capital remains badly managed. This effect would disappear if the number of agents grew asymptotically. Another nonmonotonicity is documented in Panel (j): when the inheritance of talent is sufficiently high inequality in firm size is monotonically decreasing in ϕ.

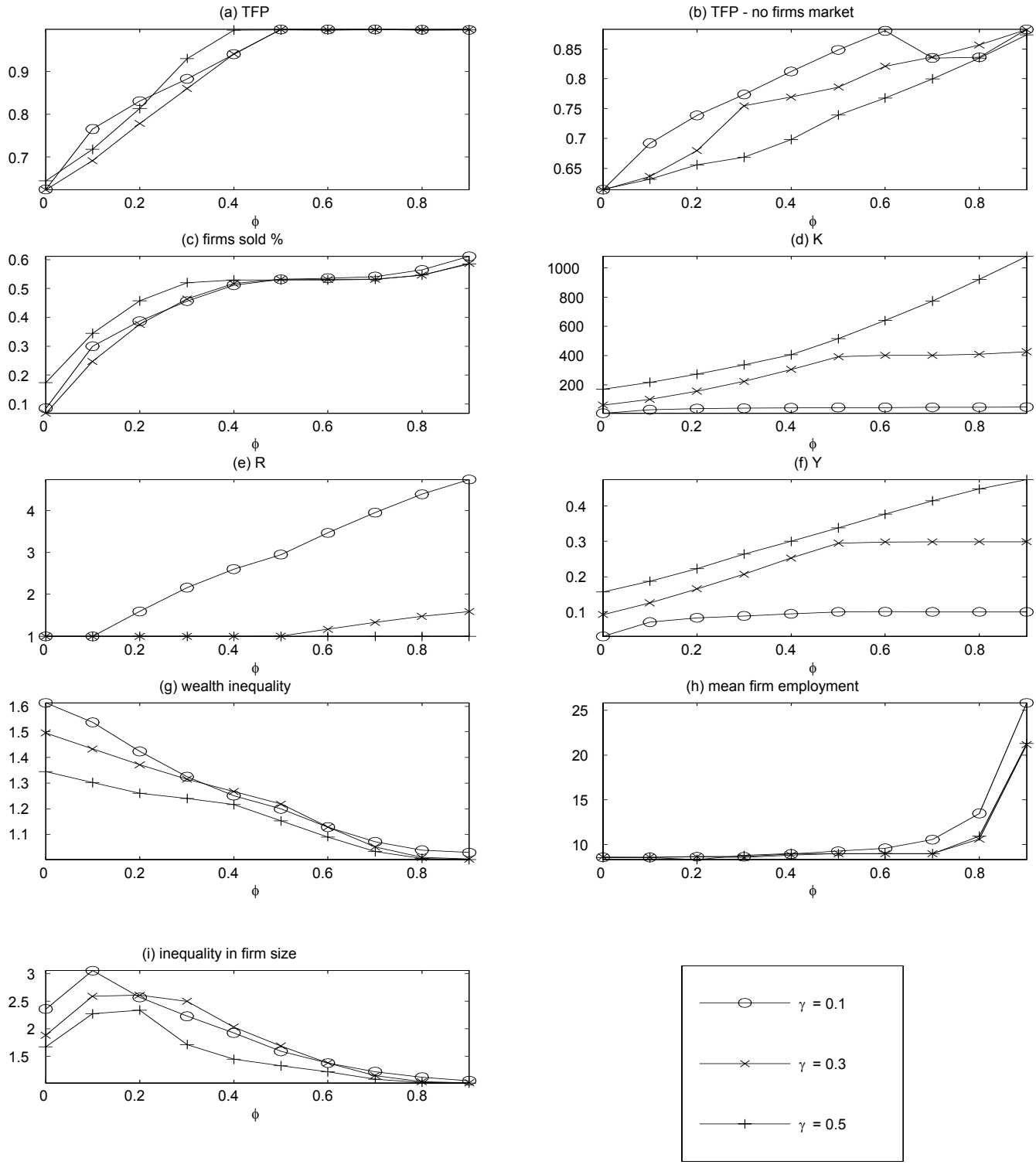

Figure 3: Variation in Saving Rate

These effects determine why in an economy without a market for control TFP tends to decline monotonically with the saving rate [Panel (b)]. When all these effects are taken into account, the overall effect of the saving rate on TFP is nonmonotonic but pretty small [Panel (a)].

6.4 Effects of Relative Ability

Another interesting nonmonotonicity arises in connection with the relative ability θ_H/θ_L. We consider five cases: 1, 1.15, 1.3 (our benchmark), 1.45 and 1.6. In Panel (a) of Figure 4 we see that at low levels of ϕ a greater efficiency gap between talented and untalented managers leads to larger losses in aggregate TFP. This reflects the loss in efficiency of those firms that are badly run. But another effect of an increase in θ_H/θ_L is that the gains from trade between the talented and the untalented increase, leading to greater firm reallocation [as also seen in Panel (c)]. Hence, a greater ability gap also means that fewer firms are in untalented hands. The figure shows that this second effect becomes dominant for larger values of ϕ. Another result of interest in this figure is Panel (d), where we can gauge the additional role of heterogeneity in talent in depressing capital accumulation over and above more standard models of credit constraints with homogeneous ability. We see that dynastic management ($\theta_H/\theta_L > 1$) has an additional non-trivial effect.

Finally, notice that dynastic management ($thetaH/thetaL > 1$) is also key to generating the inverted U shaped relationship between firm sizes and contract enforcement [see Panel (i)]. Heterogeneity in bequests exerts only a small effect in the distribution of firms' sizes. The intutition is that the process of capital accumulation tends to reduce the impact of bequests' inequality on firms' sizes in the long run.

6.5 Variation in α, ω, and λ, and Summing Up

Robustness to alternative values of the (augmented) labor share parameter α and the number of talented individuals in the population is explored in Figures 5, 6, and 7, respectively. The overall message from these figures, as well as from all the previous ones, is that the exact quantitative impact of dynastic management on TFP, capital accumulation, and output depends on the specific values of the model's parameters one uses. Nevertheless, in the vast majority of the plausible parameter space the effects are quantitatively substantial and indicate that through dynastic management, poor

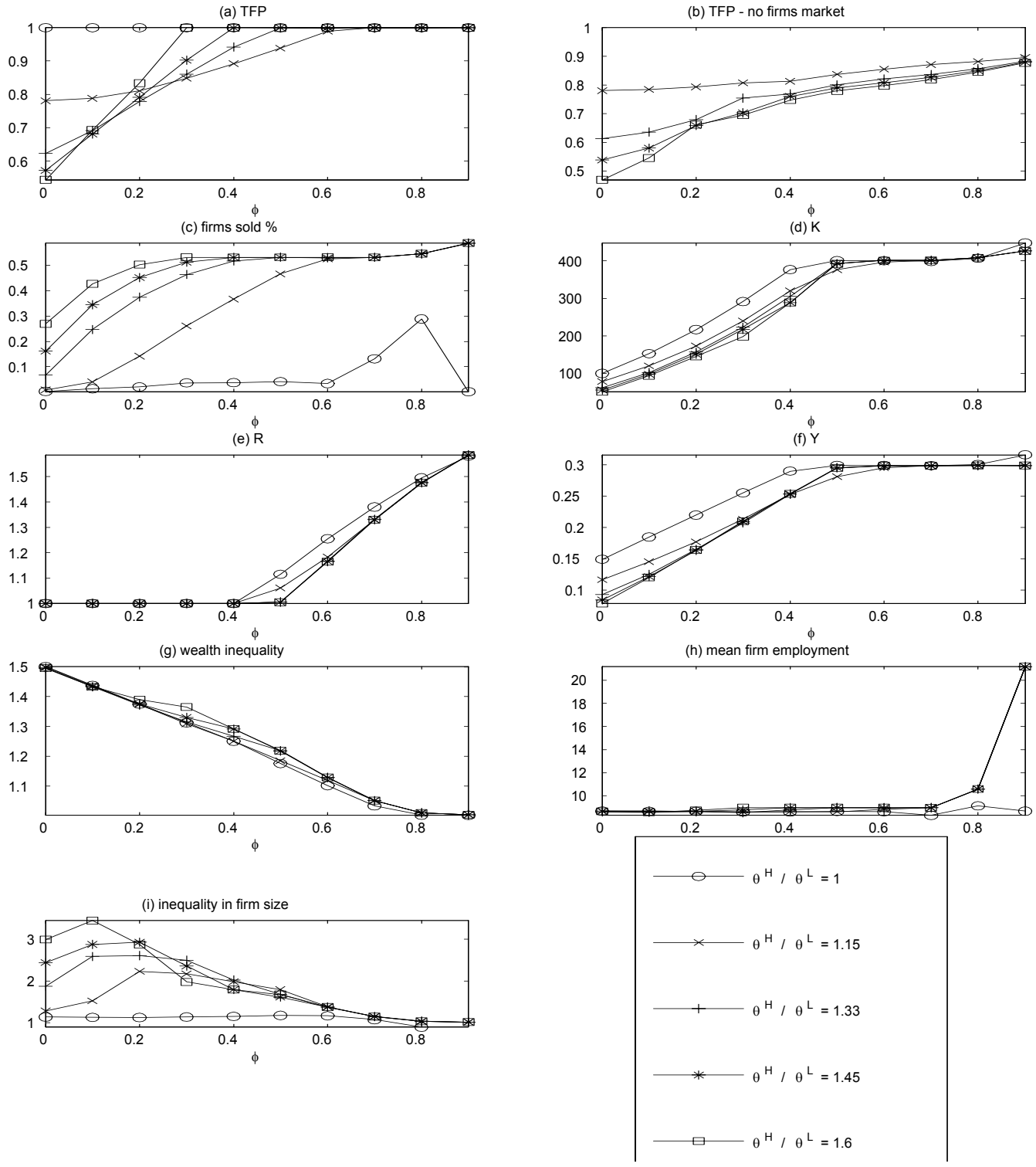

Figure 4: Variation in Relative Ability

contract enforcement may be an important contributor to the observed differences in aggregate TFP across countries.

7 Conclusions

This paper has argued that one of the adverse consequences of poor contract enforcement is a failure of meritocracy: untalented heirs of productive assets – rather than talented individuals not born to wealth – carry critical decision-making responsibilities. We present a growth model where poor contract enforcement leads to dynastic management, i.e. untalented heirs own and manage family firms. A plausible calibration of our model shows that the aggregate efficiency costs of this failure of meritocracy may be severe, and explain as much as 50 percent of cross-country differences in TFP. But our calibration also shows how poor contract enforcement shapes capital accumulation, per capita income, wealth inequality, and the size distribution of firms.

The broad message of our analysis is that poor contract enforcement inhibits the working of the market for corporate control and the functioning of credit markets. The first effect is responsible for the existence of dynastic management, which adversely affects TFP. The second effect primarily discourages borrowing, thus reducing capital accumulation. The combination of these two effects adversely impacts per capita income.

While our analysis emphasizes cross-country differences in contract enforcement, there are other important institutional variables that may also contribute to differences in meritocracy. To name but a few, regulatory barriers to entry, estate taxation, and norms restricting the ability of parents to dispose of their wealth among their children as they see fit (as opposed, say, to following a strict principle of *primo geniture*) are all worth of attention in future work.[32] Our analysis does have some preliminary results on the role of barriers to entry, as an increase in the number of licenses, ω, could be thought of as a response to a decline in bureaucratic obstacles to setting up a firm. Of course a proper modelling of this mechanism is beyond the scope of this paper, but the results in Figure 7 suggest that combining cross-country differences in contract enforcement with cross-country differences in barriers to entry may enhance the explanatory power of dynastic management for TFP differences.

[32]See Bloom and Van Reenen (2005) for a discussion of estate taxes and *primo geniture* in the context of family firms.

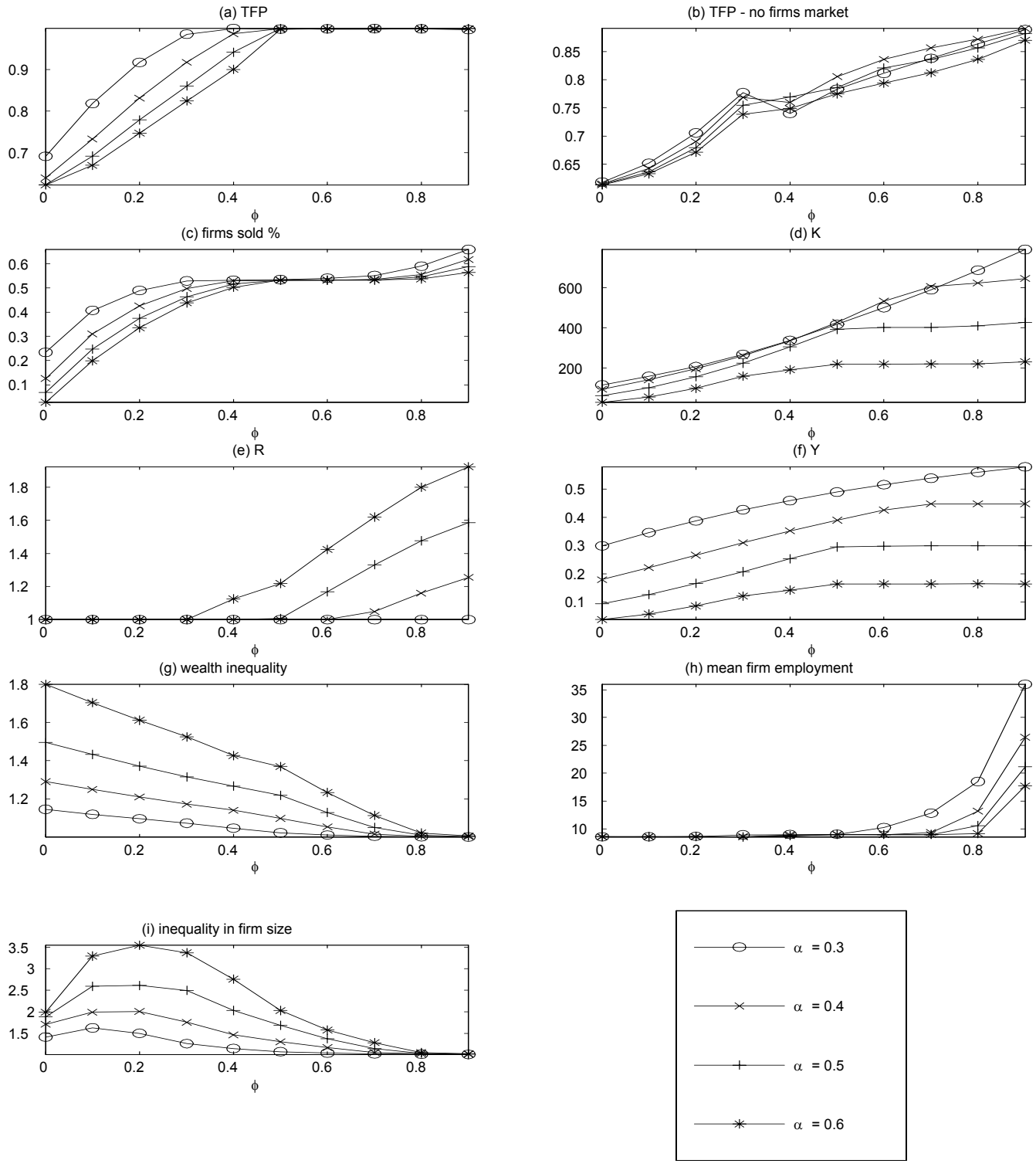

Figure 5: Variation in Owner Share

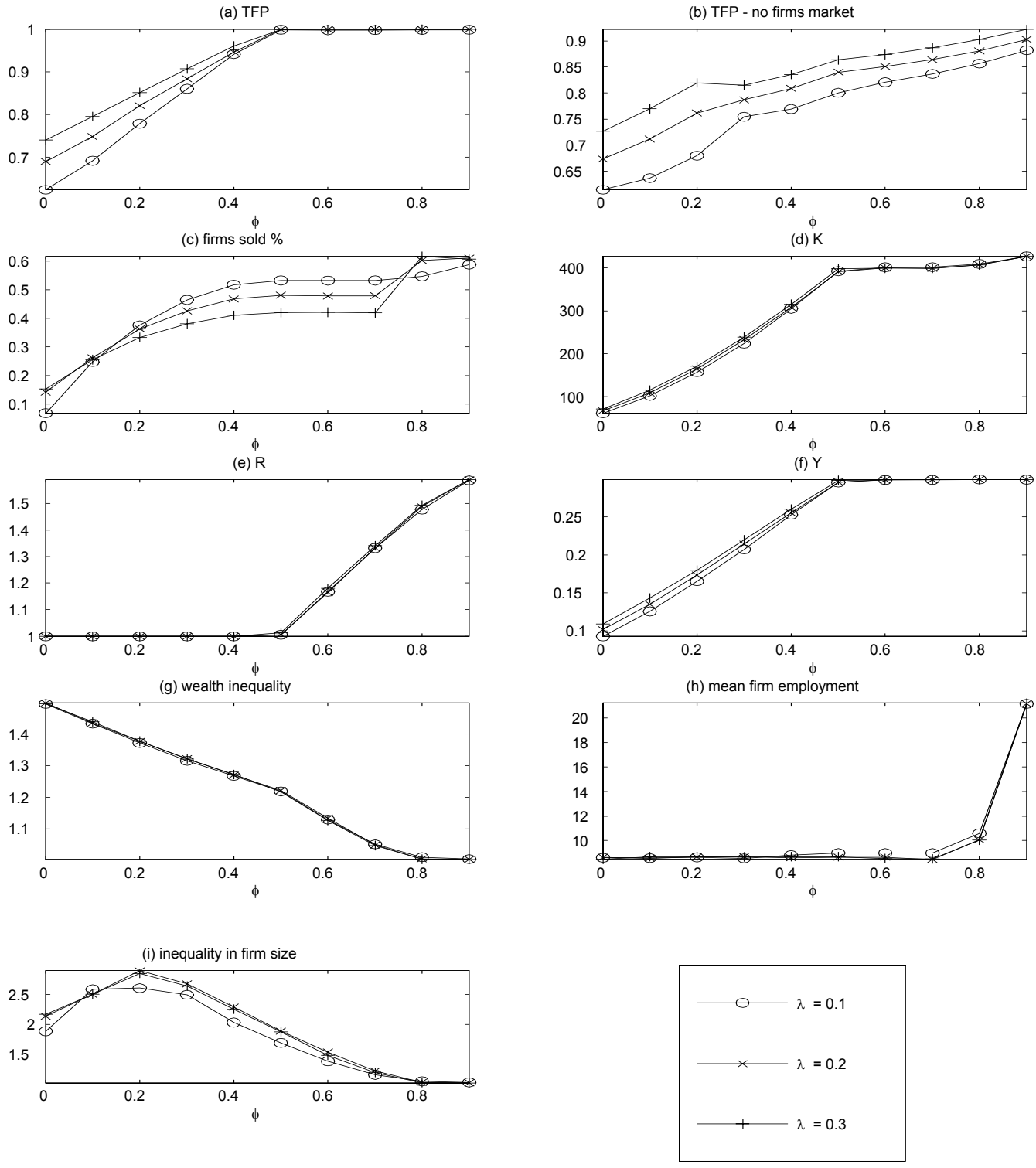

Figure 6: Variation in Supply of Talent

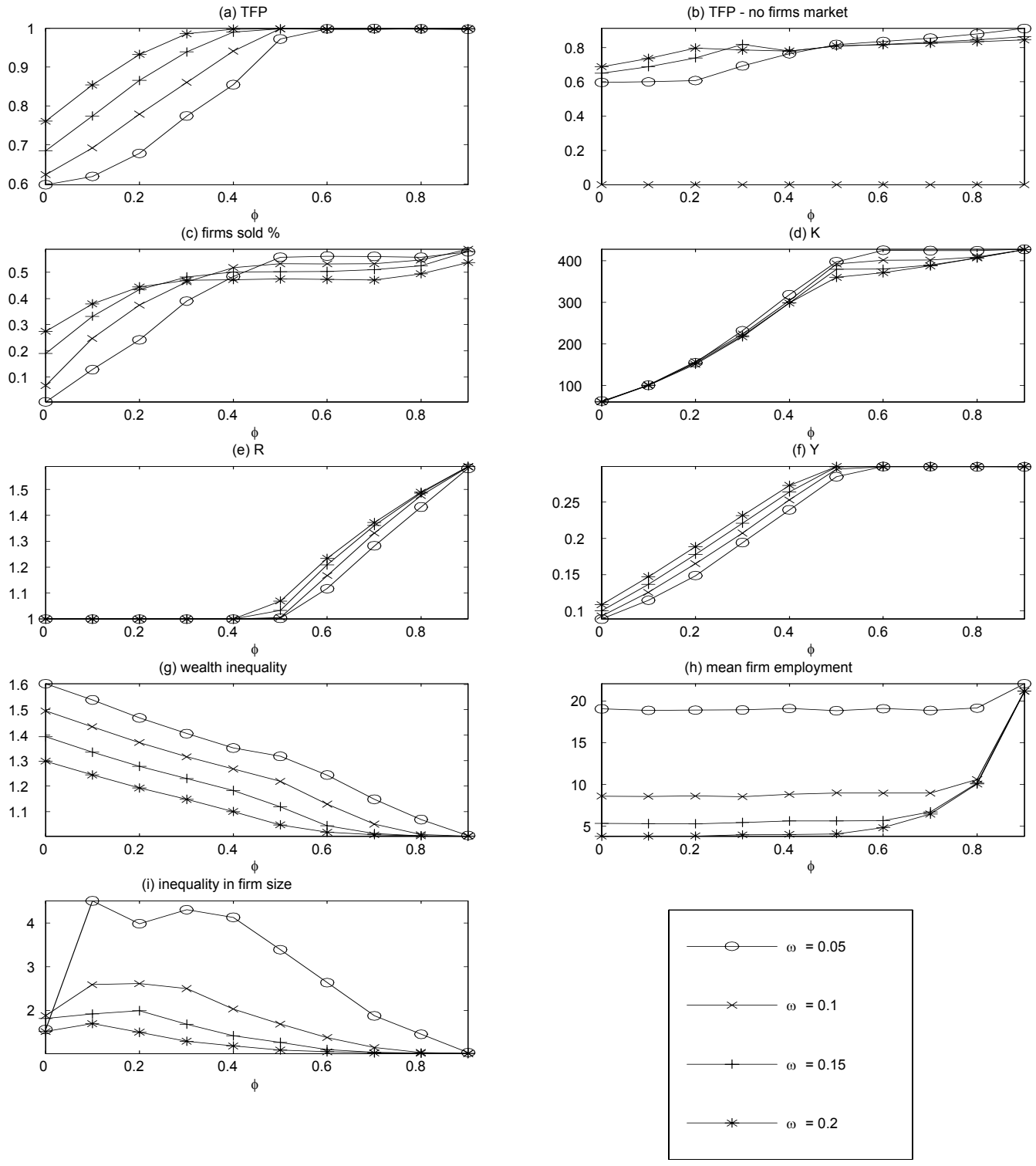

Figure 7: Variation in Number of Licenses

Whatever the nature of the institutional frictions that give rise to variation in the incidence of dynastic management, our analysis does not address the political-economy causes of such frictions. Who are the winners and losers of poor contract enforcement, barriers to entry, inheritance laws, etc.? Very recently, some authors have begun to investigate these questions [e.g. Acemoglu (2004), Perotti and Volpin (2004), Rajan and Zingales (2003), Morck, Wolfenzon, and Yeung (2004)], but much work remains to be done. We believe that the rich heterogeneity characterizing our model can be helpful in thinking about which coalitions will oppose/support different types of efficiency enhancing reforms, and thus which of them are most politically feasible [see Caselli and Gennaioli (2005) for an example].

A Appendices

A.1 Opening a Market for Managers

In this appendix we open up a market where untalented owners of firms may hire talented workers to run operations as managers. We show that the existence of this market does not affect the equilibrium of the economy, because it cannot solve the basic contracting problems that plague economies with $\phi < 1$. We consider the family of contracts in which if agent i becomes a manager, he receives an amount t_i from the owner ex-ante (i.e. before running the firm), and promises to return to the owner a dividend $m_i \geq 0$ after production is carried out (recall that there is no uncertainty so m_i is known). The managerial contract must provide the manager with the incentive to repay both shareholders and creditors. Again if the manager defaults on his obligations the courts will seize a fraction ϕ of what he diverted. Suppose that agent i is endowed with wealth b_i. Then, it must be that:

$$\pi(A_i)K_i - m_i - R[K_i - (b_i + t_i)] \geq (1 - \phi)\pi(A_i). \tag{12}$$

The left hand side of (12) represents what the manager obtains if he repays, namely profits minus dividends minus repayments to creditors. The right hand side represents what he obtains if he defaults on creditors and shareholders. Notice that if the firm is worth running the manager also always invests his own wealth $b_i + t_i$. Conditional on the terms of the managerial contract m_i and t_i equation (12) describes manager i's "capital capacity."

Turning now to the participation constraints, we have that the heir must be at least indifferent as to hire a manager or sell the firm. In other words, we must have $m_i - Rt_i \geq Rp$. On the other hand, the manager must be at least as well off as when buying a license on the market for control. His life time income if he buys a license is given by equation (4). Comparing this to the left-hand-side of (12) we see that the manager participates only if $m_i - Rt_i \leq Rp$. Thus, the only case in which the market for managers can operate in equilibrium is when $m_i + Rt_i = Rp$. But then 12 implies that talented outsiders are indifferent between being managers or buying firms, and untalented owners are indifferent between hiring managers or selling their firms. Hence, in equilibrium, the exact same level of meritocracy prevails whether the market for managers exists or not, or in other words the market for managers performs no allocative function over and above the one performed by the market for control.

A.2 Calibration of η_H, η_L

Bouchard and McGue (1981) survey the genetic research on IQ. Their paper is a summary of 111 studies on familial resemblances in measured intelligence. They argue that the pattern of average correlations in IQ scores is consistent with a polygenic theory of inheritance, which says that the higher the proportion of genes two people have in common, the higher the average correlation between their IQ. In particular, they estimate that the average correlation of Parent-Offspring IQ scores is 0.42.

We calibrate the stochastic process for the intergenerational transmission of talent by assuming that the IQ score of a person is one to one related to his ability θ. In particular, under the assumed stochastic process for talent, the steady state fraction of talented people in the population is λ whenever

$$\lambda(1-\eta_H) = (1-\lambda)(1-\eta_L) \tag{13}$$

The average score, therefore, is $EIQ = \lambda\theta_H + (1-\lambda)\theta_L$, and the variance is

$$VIQ = \lambda(\theta_H - EIQ)^2 + (1-\lambda)(\theta_L - EIQ)^2 = \lambda(1-\lambda)(\theta_H - \theta_L)^2.$$

Furthermore, the parents-children covariance can be computed as follows:

$$\begin{aligned} CIQ &= \lambda\eta_H(\theta_H - EIQ)^2 + [\lambda(1-\eta_H) + (1-\lambda)(1-\eta_L)](\theta_H - EIQ)(\theta_L - EIQ) + \\ &\quad +(1-\lambda)\eta_L(\theta_L - EIQ)^2 \\ &= (\eta_H + \eta_L - 1)\lambda(1-\lambda)(\theta_H - \theta_L)^2 \end{aligned}$$

Thus, the correlation coefficient of parents' talent with children talent, q, is $CIQ/VIQ = \eta_H + \eta_L - 1 = q$. Together with (13), this last condition implies the calibration conditions (10) and (11).

References

Daron Acemoglu, James A. Robinson and Simon Johnson, 2001, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, December.

Acemoglu, D. (2003): "The Form of Property Rights: Oligarchic versus Democratic Societies", *NBER Working Paper*, n.10037.

Aganin, A., and Volpin, P. (2004): "The History of Corporate Ownership in Italy", in Morck, R. (ed.), *The History of Corporate Governance around the World: Family Business Groups to Professional Managers*, University of Chicago Press, forthcoming.

Almeida, H., and Wolfenzon, D. (2005): "A Theory of Pyramidal Ownership and Family Business Groups", *NBER Working Paper*, n. 11368.

Banerjee, A., and Munshi, K. (2004): "How Efficiently is Capital Allocated? Evidence from the Knitted Garment Industry in Tirupur", *Review of Economic Studies*, 71(1), pp. 19-42.

Becht, M., and DeLong, J.B. (2004): "Why has there been so little blockholding in America?", in Morck, R. (ed.), *The History of Corporate Governance around the World: Family Business Groups to Professional Managers*, University of Chicago Press, forthcoming.

Bennedsen, M., Nielsen, K., Perez-Gonzales, F., and Wolfenzon, D. (2005): "Inside the Family Firm: The Role of Families in Succession Decisions and Performance", unpublished, New York University.

Bertrand, M., Johnson, S., Samphantharak, K., and Schoar, A. (2004): "Mixing Family with Business: A Study of Thai Business Groups and the Families Behind Them", unpublished, University of Chicago.

Bhattacharya, U., and Ravikumar, B. (2001): "Capital Markets and the Evolution of Family Businesses", *Journal Of Business*, 74(2), pp. 187-219.

Bhattacharya, U., and Ravikumar, B. (2003): "From Cronies to Professionals: The Evolution of Family Firms", unpublished, Indiana University.

Bloom, N., and Van Reenen, J. (2005): "Measuring and Explaining Management Practices Across Firms and Countries", unpublished, London School of Economics and Political Science.

Bouchard, T., and McGue, M. (1981): "Familial Studies of Intelligence: A Review", Science, 10, pp. 1055-1058.

Burkart, M., Panunzi, F., and Shleifer, A. (2003): "Family Firms", *Journal of Finance*, 58(5), pp. 2167-2201.

Burstein, A., and Monge-Narajo, A. (2005): "Aggregate Consequences of Foreign Firms in Developing Countries", unpublished.

Cagetti, M., and De Nardi, M. (2002): "Entrepreneurship, Frictions and Wealth", *Staff Report*, n. 322, Federal Reserve Bank of Minneapolis.

Caselli, F. (2005): "Accounting for Cross-Country Income Differences", *Handbook of Economic Growth*, forthcoming.

Caselli, F., and Coleman, W. J. II (2005): "The World Technology Frontier", *American Economic Review*, forthcoming.

Caselli, F., Esquivel, G., and Lefort, F. (1996): "Reopening the Convergence Debate: A New Look at Cross-Country Growth Empirics", *Journal of Economic Growth*, 1(3), pp. 363-389.

Caselli, F., and Feyrer, J. (2005): "The Marginal Product of Capital", *Working Paper*, London School of Economics and Political Science.

Caselli, F., and Gennaioli, N. (2005): "Credit Constraints, Competition and Meritocracy", *Journal of the Ecuropean Economic Association*, 3(2-3), pp. 679-689.

Caselli, F., and Morelli, M. (2004): "Bad Politicians", *Journal of Public Economics*, 88(3-4), pp. 759-782.

Castro, R., Clementi, G.L., and McDonald, G. (2004): "Investor Protection, Optimal Incentives, and Economic Growth", *Quarterly Journal of Economics*, 119(3), pp. 1131-1175.

Chami, R. and IMF Institute (2001): "What's Different About Family Businesses?", *IMF Working Paper*, 01/70.

Chandler, A. (1994): *Scale and Scope: The Dynamics of Industrial Capitalism*, Belknap Press.

Claessens, S., Djankov, S., and Lang, L. H. P. (2000): "The Separation of Ownership and Control in East Asian Corporations", *Journal of Financial Economics*, 58(1-2), pp. 81-112.

Cooley, T. F., and Prescott, E. C. (1995): "Economic Growth and Business Cycles", in T.F. Cooley (ed.), *Frontiers of Business Cycle Research*, Princeton University Press.

Davis, P. (1983): "Realizing the Potential of the Family Business", *Organizational Dynamics*, 12(1), pp. 47-56.

Djankov Simeon, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer, "Courts", *Quarterly Journal of Economics*, May, 2003.

Evans, D. S., and Jovanovic, B. (1989): "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints", *Journal of Political Economy*, 97(4), pp. 808-827.

Franks, J. R., and Torous, W. N. (1994): "A comparison of financial recontracting in distressed exchanges and Chapter 11 reorganizations", *Journal of Financial Economics*, 35(3), pp. 349-370.

Galor, O., and Tsiddon, D. (1997): "Technological Progress, Mobility and Economic Growth", *American Economic Review*, 87(3), pp. 363-382.

Gersick, K., Davis, J., and McCollom Hampton, M. (1997): *Generation to Generation: Life Cycles of the Family Business*, Harvard Business School Press.

Ghatak, M., Morelli, M., and Sjöstrom, T., (2002): "Credit Rationing, Wealth Inequality, and the Allocation of Talent", *STICERD Discussion Papers*, n. TE/02/441, London School of Economics and Political Science.

Giné, X., and Townsend, R. M., (2004): "Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice", *Journal of Development Economics*, 74(2), pp. 269-307.

Hall, R. E., and Jones, C. I. (1999): "Why do Some Countries Produce so Much More Output per Worker than Others?", *Quarterly Journal of Economics*, 114(1), pp. 83-116.

Hasller, J., and Mora, J. V. R. (2000): "Intelligence, Social Mobility and Growth", *American Economic Review*, 90(4), pp. 888-908

Hendricks, L. (2002): "How Important is Human Capital for Development? Evidence from Immigrant Earnings", *American Economic Review*, 92(1), pp. 198-219.

Hurst, E., and Lusardi, A. (2004): "Liquidity Constraints, Household Wealth, and Entrepreneurship", *Journal of Political Economy*, 112(2), pp. 319-47.

Islam, N. (1995): "Growth Empirics: A Panel Data Approach", *Quarterly Journal of Economics*, 110(4), pp. 1127-1170.

Jeong, H., and Townsend, R. M. (2005): "Discovering the Sources of TFP Growth: Occupational Choice and Financial Deepening", *IEPR Working Papers*, 05/19.

Kiyotaki, N. (1998): "Credit and Business Cycles", *Japanese Economic Review*, 49(1), pp. 18-35.

Klenow, P., and Rodriguez-Clare, A. (1997): "The Neoclassical Revival in

Growth Economics: Has it Gone Too Far?", *NBER Macro Annual 1997*, pp. 73-114.

Knack, S., and Keefer, P. (1995): "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures", *Economics and Politics*, 7(3), pp. 207-227.

Landes, D. (1969): *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*, Cambridge University Press.

Lansberg, I. (1983): "Managing Human Resources in Family Firms: The Problem of Institutional Overlap", *Organizational Dynamics*, 12(1), pp. 39-46.

La Porta, R., Lopez-De-Silanes, F., and Shleifer, A. (1999): "Corporate Ownership Around the World", *Journal of Finance*, 54(2), pp. 471-517.

Lloyd-Ellis, H., and Bernhardt, D. (2000): "Enterprise, Inequality, and Economic Development", *Review of Economic Studies*, 67(1), pp. 147-168.

Lucas, R. E. Jr. (1978): "On the Size Distribution of Business Firms", *Bell Journal of Economics*, 9(2), pp. 508-523.

Mann, T. (1901): *Buddenbrooks*, S. Fisher Verlag.

Maoz, Y. D., and Moav, O. (1999): "Intergenerational Mobility and the Process of Development", *Economic Journal*, 109(458), pp. 677-697.

Morck, R., and Steier, L. (2005): "The Global History of Corporate Control: An Introduction", *NBER Working Paper*, n. 11062.

Morck, R., Strangeland, D., and Yeung, B. (2000): "Inherited Wealth, Corporate Control, and Economic Growth: The Canadian Disease?", in Morck, R. (ed.), *Concentrated Corporate Ownership*, NBER Conference Volume, University of Chicago Press.

Morck, R., Wolfenzon, D., and Yeung, B. (2004): "Corporate Governance, Economic Entrenchment and Growth", *NBER Working Paper*, n. 10692.

Mulligan, C. (1997): *Parental Priorities and Economic Inequality*, University of Chicago Press.

Murphy, K. M., Shleifer, A., and Vishny, R. W. (1991): "The Allocation of Talent: Implications for Growth", *Quarterly Journal of Economics*, 106(2), pp. 503-530.

Parente, S. L., and Prescott, E. C. (2000): *Barriers to riches (Walras-Pareto Lectures)*, MIT Press.

Perez-Gonzales, F. (2001): *Does Inherited Control Hurt Firms'Performance?*,

PhD dissertation, Harvard University.

Perotti, E., and Volpin, P. (2004): "Lobbying on Entry", *CEPR Discussion Paper*, n. 4519.

Quintin, E. (2003): "Limited Enforcement and the Organization of Production", *Center for Latin America Working Papers*, n. 0601, Federal Reserve Bank of Dallas.

Rajan, R. G., and Zingales, L. (2003): "Banks and Markets: the Changing Character of European Finance", *CEPR Discussion Paper*, n. 3865.

Restuccia, D., and Rogerson, R. (2004): "Policy Distortions and Aggregate Productivity with Heterogeneous Plants", *Meeting Papers*, n. 69, Society for Economic Dynamics.

Rodrik, Dani, Arvind Subramanian and Francesco Trebbi, 2002, "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development," NBER working paper.

Shleifer, A., and Wolfenzon, D. (2002): "Investor Protection and Equity Markets", *Journal of Financial Economics*, 66(1), pp. 3-27.

Solon (1992): "Intergenerational Income Mobility in the United States", *American Economic Review*, 82(3), pp. 393-408.

Solow (1956): "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, 70(1), pp. 65-94.

Villalonga, B., and Amit, R. (2005): "How do Family Ownership, Management, and Control Affect Firm Value?", *Journal of Financial Economics*, forthcoming.

Volpin, P. (2002): "Governance with Poor Investor Protection: Evidence from Top Executive Turnover in Italy", *Journal of Financial Economics*, 64(1), pp. 61-90.

Zimmerman (1992): "Regression towards Mediocrity in Economic Status," *American Economic Review*, 82(3), 409-29.