Blood and Money: Kin altruism and the governance of the family firm

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Abstract

This paper develops a theory of family-firm governance based on inclusive fitness maximisation (Hamilton, 1964). Family members weigh the payoffs to relatives in their decisions in proportion to their relatives' degree of relatedness. The theory shows that family management entails both costs and benefits. A family bond between owners and managers leads managers to partially internalise owners' gains from their actions and thus reduces agency conflicts over ex ante decisions. At the same time, family bonds weaken owners' incentives to monitor managers and thus causes a "policing problem" within the family business. This policing problem results in both increased diversion and increased monitoring costs. Family control is characterised by lower formal compensation of managers, more informal compensation through diversion as well as better alignment of firm/manager effort incentives. Whether the costs or benefits of family governance dominate depends the institutional environment in which the family business operates. Family ownership is not a substitute for governance institutions. Rather kin relatedness and governance institutions are complements, with family firms extracting more marginal value from governance improvements than non-family firms. Moreover, private equity markets and markets for professional managers lead owners to abandon family management in cases where family management produces no efficiency gains and can even improve the performance of family firms that do not resort to these markets.

Keywords: Corporate governance, entrepreneurship, kin altruism, contract theory

1 Introduction

The organisation of economic activity around family units is globally pervasive. The vast majority of businesses are controlled by families As pointed out by Fukuyama (1995), outside the Anglo-sphere, Northern Europe, and Japan, the preponderance of non-state firms are family controlled. Even in the U.S., the majority of firms with revenues less than $500 million are family controlled, and many very large firms are tied to families, e.g., Ford, Koch Industries, and Wall Mart. While biological kinship is not a defining characteristic of a family given the possibility of adoption, biological kinship nevertheless is fundamental to defining the concept of family and is descriptive of the vast majority of family units. The aim of this paper is to develop a theory of family firms based on this fundamental property.

This theory is founded on the concept of inclusive fitness developed by Hamilton (1964). The inclusive fitness of a given agent is that agent's own fitness summed with the weighted fitness of all other agents, the weights being determined by the extent of those other agents' kinship to the given agent. Because related agents share genetic material, genes favouring *kin altruism*, behaviour that increases inclusive fitness at the cost of individual fitness, will be favoured by natural selection. The logic behind inclusive fitness is that closely related agents share many genes. Thus, even when kin altruism is harmful to the individual exhibiting it, kin altruism can increase in a population if the costs to the agent are low relative to the benefits to kin. Selection of kin altruistic strategy requires

$$rB > C, \tag{1}$$

where r represents the degree of relatedness, B the benefit to the relative, and C is the cost to the altruistic agent.

In this theory of the family firm, I identify fitness with terminal wealth less any non-pecuniary effort costs and assume that the each family member maximises its inclusive fitness. I model a family firm where the owner and manager, endowed with such preferences are related, with the degree of relatedness determined by the degree of kinship. Thus, the degree of relatedness will vary between 0.50 for a siblings to, for example, 0.02 for fourth cousins.[1] Whether or not kin altruism is literally descriptive of owner/manager preferences in family firms, as cultural values and norms must also play some role in intra-family behaviour, kin altruism is clearly a hypothesis worthy of consideration. Its theoretical foundation its simple, its driving exogenous variable–kinship–is observable, and, as will be detailed below, its predictions are generally well-supported by evidence.

The key characteristics of family altruism, motivated by the Hamiltonian concept of inclusive fitness, are that altruism is symmetric, limited, and "harsh." The bonds of relation are symmetric because they are derived from a symmetric relation, relatedness. Altruism is limited because, except for identical twins, even the tightest kinship

[1]Note this perspective is a reduced-form approximation to the conditions for natural selection favouring altruistic traits. First, selection requires only genetic similarity, such similarity need not be based of descent. Second, descent itself can emerge from every line through which two individuals are connected by common ancestors, not just direct lines of descent. These simplifications will not have any effect on the conclusions of my analysis.

bonds, parent/offspring or sibling/sibling, only produce relatedness sufficient to internalise half of the effect of an agents' actions on a relative. Moreover, this sort of altruism is somewhat harsh in that it aims only at maximising total inclusive fitness and is thus not concerned with the distribution of fitness across relations. For this reason, a family agent in my analysis would willing to sacrifice the welfare of a single relation to further his own genetic interests embodied in the family as a whole. Fairness to specific family members is not a consideration. For example, Mayer Amschel Rothchild's decision to disinherit his daughters in order to keep family wealth in what he believed to be the more able hands of his sons is quite consistent with the specification used in this analysis.[2] In contrast, much of the research on the effect of altruism on behaviour in economics has followed Becker (1974) and focused on asymmetric altruism: one selfless party acts as a donor gifting selfish donees, with the donor having concave and increasing utility in the income of the donees.

Family altruism is introduced into a standard principal/agent model of owner/manager interaction. The owner controls a project called "the firm." In order for the project to produce output, effort on the part of the manager is required. To obtain managerial effort, the owner must offer the manager a compensation contract that induces the manager to accept employment. Effort is neither observable nor verifiable. Effort produces a stochastic cash flow. The cash flow is observed only by the manager. After observing the cash flow, the manager reports cash flows to the owner. The owner can either accept the manager's report or verify the report. Verification is costly but perfect. As in, for example, Townsend (1979), the compensation received by the manager is a contracted function of the manager's report and the results of verification (if verification occurs) and satisfies limited liability. The owner cannot, however, commit contractually to verify the cash flow. Rather the verification decision is the owner's best response to the manager's report. In the basic model, it is assumed that the firm is entirely owned by one family member and can only be managed by another family member. Later, the effects of outsider ownership and managerial labour markets are considered.

The basic results of this model are that, at any fixed compensation level, a kinship relation between the owner and the manager leads to more managerial effort, a lower likelihood of owner monitoring manager's reports of low cash flows, and a greater likelihood that the manager will falsely report low cash flows. The net effect of less monitoring of low reports and more low reports is that the probability of monitoring increases with kinship as does the probability of diversion by the manager. This occurs because monitoring is costly and reduces total family welfare while the owner's loss from diversion is partially offset by gains to the related manager. This makes the related owner a soft monitor. This softness is exploited by the related manager who increases her attempts to divert so much that the overall probability of monitoring, and thus the attendant dissipation costs, increases. At the same time, the effort incentives of the manager are improved by kinship because the manager partially internalises the owner's gains from managerial effort.

When the model is closed by fixing compensation, two new effects of kinship emerge: one favouring effi-

[2] See Mayer (2012).

ciency which we term the "bright-side" scenario and the other retarding efficiency, which we term the "dark-side" scenario. The bright-side scenario occurs when the incentive constraint for ex ante effort is binding. In this case, the owner selects from incentive compatible effort–compensation pairs to maximise his welfare. The tradeoff—at higher levels of compensation total family value is larger but the manager's effort rent's are also larger. Kin altruism has two effects on the effort–compensation pair selected by the owner. First, at any given level of compensation, because of the kin altruism of the manager, effort is higher, thus the rent concession required to induce a given level of effort is less. Second, the kin altruism of the owner means that the owner partially internalises the manager's effort rent. Thus, the owner is more willing to concede increased compensation for effort. The two effects are reinforcing, and lead to higher effort and thus total output. Moreover, the increase in compensation reduces the manager's incentive to attempt diversion because the manager's gain from diversion, which is the owner's residual share of output, is smaller. Thus, in the bright-side scenario, kinship's adverse effect on the monitoring problem is mitigated and perhaps even outweighed by its favourable effect on the ex ante effort problem.

In contrast, in the "dark-side" scenario, the reservation constraint is binding, and the endogenous determination of compensation increases the dissipative cost of monitoring. When the manager is related to the owner, and the manager is "irreplaceable," the manager's walk-away value from rejecting an employment offer made by the owner will partially internalise the loss to the owner from the failure of the firm to operate. This makes the related manager's minimum acceptable compensation less than the minimal acceptable compensation of an unrelated manager. Thus, the owner can hold up the manager with the threat of not undertaking the project and offer the related manager less compensation than an equivalent unrelated manager would receive. We call this a loyalty holdup. Because of loyalty holdups, kinship lowers compensation. But lower compensation encourages more diversion which in turn stimulates more monitoring but not enough increased monitoring to prevent diversion from increasing. In some parameterisations of the dark-side scenario, the manager's value, which includes both compensation and expected diversion gains, is greatest for unrelated and highly related managers. Unrelated managers receive large compensation packages and divert little; closely related managers receive small compensation packages but divert a significant fraction of firm value. Firm value is greatest and the manager's value is smallest for intermediate degrees of kinship.

When we extend the model and permit the firm to substitute general human capital of a non-related manager for the specific human capital of the related manager, the bargaining position of the related manager actually improves because the owner can no longer credibly threaten project failure if the related manager rejects the owner's compensation offer. This increases the compensation for the relative manager and thus lowers diversion and increases efficiency. Hence, the emergence of professional labour markets has a positive effect on family firm performance even if family firms choose to retain family management. Moreover, when general human capital is a perfect substitute for firm-specific human capital, family owners will opt out of family management when it is less efficient. The presence of outside financiers who are able to monitor managers, e.g., private equity firms, also has a profound effect on the efficiency of family firms. When private equity finance is available, if the owner decides to cede control to private equity investors, it is always optimal for the owner to completely liquidate his ownership stake. If these private equity investors are able to monitor the manager with costs no higher than the family owner, firm owners will sell out in the dark-side scenario and the remaining family firms will be those firms in which family ownership increases economic efficiency. Thus, private equity finance is viable even when private equity financiers have somewhat higher costs of monitoring than family owners and once private equity investors are able to reduce their monitoring costs to those of family owners, they will buy out the entire inefficient family firm sector. This analysis generates a number of empirical implications which are detailed below:

- Firm performance relative to managerial compensation should be higher in family firms
- Family firms should exhibit weaker internal controls and a higher propensity toward infighting
- Family firms should exhibit better performance when they operate in economies or industries which feature efficient professional managerial labour and/or private equity markets.
- Family firm's performance relative to non-family firms should be increasing in the quality of governance institutions
- Governance and kinship relationships within firms are complements not substitutes with respect to performance
- The incidence of family firms relative to non-family firms will be negatively related to management professionalisation and development of private equity markets
- In economies with developed private equity and managerial labour markets, an increased quality of governance institutions will increase the fraction of firms under family control.

1.1 Related literature

Given that this paper is founded on the centrality of relatedness in understanding family business, it is only appropriate that it fully reveal its own family tree. Its relatives come from two distinct families of research literature—economics/financial economics on one side and evolutionary biology/psychology on the other. The motivating idea for the theory—inclusive fitness—has been the subject of a great deal of research in both evolutionary biology and psychology. For example, Madsen, Tunney, Fieldman, Plotkin, Dunbar, Richardson, and McFarland (2007) performs an experiment providing evidence that the degree of genetic relation predicts the costs agents are willing to bear to increase the welfare of other agents. In this experiment, to control for cultural differences in family orientation, three disparate sample populations were studied—UK university students, and two different South African Zulu populations. Parties at various degrees of biological relation to the subjects received payments based on how long the subjects would stand in a painful position. The results of the experiments supported kin altruism by documenting that subjects' willingness to impose physical costs on themselves was increasing in the relatedness of the payee. The overall willingness to bear costs for relatives was similar in UK students and South African Zulus although the shape of cost-to-relatedness curve was somewhat different, with UK students willingness to sacrifice dropping sharply when moving from close to more distant relatives ($r = 0.5$ to $r = 0.25$) while the sharp drop off in the South African subjects occurred between distal relatives ($r = 0.125$) and non-relatives.[3] Field experiments also seem to support the role of genetic relatedness in behaviour. For example, Daly and Wilson (1988) find that the intra-family child homicide probability is 11 times higher for step parents compared with natural parents.Evolutionary biology as produced overwhelming evidence for kin altruism in non-humans species, from primates to bacteria. For example, Dudley and File (2007) shows that a common plant, sea rocket, will grow its roots more aggressively when potted with unrelated plants than when potted with relatives.[4]

However, kin altruism is the only concept used in this work that is drawn from evolutionary theory. The rest of this paper's family tree can be found in the economics and financial economics literature. Many theories have been proposed for family firm behaviour. Most of these theories are based on characteristics shared by many family firms but which are not defining properties of family firms. For example, Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon (2007) argues that low human capital of family managers relative to professional outside managers accounts for the negative valuation effects of intra-family CEO succession. Almeida and Wolfenzon (2006) shows that owners with concentrated controlling stakes may have incentives to increase their access to capital through forming pyramidal ownership structures. Burkart, Panunzi, and Shleifer (2003) develops a theory of family firms based on the problem of passing control from an owner-manager to a more qualified professional manager. However, inferior human capital, concentrated controlling stakes, and owner management are not defining characteristics of family firms. There is no inherent reason for family members to have less human capital than outsiders. Large controlling stakes can be assembled by non-family agents, e.g., non-family private-equity firms. Owner-managers frequently do not involve family members in the financing and governance of their firms. Of course, all of these characteristics might be statistically associated with family ownership, and thus may have significant explanatory power for the behaviour of family firms. However, these theories are not family-firm theories in the sense that this paper is a theory of family firms. If they offer a complete explanation of family firm behaviour it would follow that there is no need for a special theory of the family firm and the explanation of family firm behaviour should be subsumed by general contract theory. The theory of family firms that is most closely linked to defining family characteristics is probably Fukuyama (1995). Fukuyama argues informally that, in the absence of general social capital, important business relations must be based on intrafamily trust. Family trust is based, in turn on cultural norms related to family loyalty. From Fukuyama's perspective, family loyalty lowers agency costs in intrafamily business transactions while, at the same time, forming closed networks and thus re-

[3] For a survey of a large body of related work see Cartwright (2000).

[4] At a more general level, one might also say that this paper is also related to the emergent literature on the effects of biology on economic and financial behaviour. See, for example, Wallace, Cesarini, Lichtenstein, and Johannesson (2007) and Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace (2010).

tarding the development of external capital and managerial labor markets. My perspective is rather different. In this paper, families control does not resolve the problem of trust and in fact leads conflict because family altruism suppresses the policing of opportunistic behaviour.[5] Further, cultural values play no role and family altruism is measured by cross-cultural constants founded on biological relatedness. Moreover, rather than being substitutes for family firms, institutional and market development strongly complement the relative performance of family firms, although such institutional development might also reduce their incidence.

The empirical literature on family firms is even more extensive than the theoretical literature. The results of this research have been inconclusive and the definitions of family firms used by different researchers have been inconsistent. For example, Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon (2007) document a negative effect of intra-family succession using Danish data. In contrast Anderson and Reeb (2003) report a positive effect of family ownership on firm performance for U.S. firms and Sraer and Thesmar (2007) report similar results for French firms. In contrast Miller, Breton-Miller, Lester, and Cannella (2007) and Villalonga and Amit (2006) find, for U.S. firms, that, after controlling for the effect of a founder/owner, family firms do not outperform non-family firms. La Porta, Lopez de Silanes, Shleifer, and Vishny (2002) document a negative effect of family trust on firm size, consistent with the hypothesis that family loyalties make raising capital and hiring labor outside of family boundaries expensive. Bertrand and Schoar (2006) find that, at the country level, family trust is negatively correlated with firm size and dependence on external finance. One problem with directly relating these papers to the hypotheses developed in this paper is that the definitions of "family firm" used in these studies vary widely and none map exactly into the definition used in this paper. In this paper, a family firm is a firm in which both management and ownership are substantially in the hands of a biological family. Many empirical studies make some family involvement in management a required characteristic for inclusion in their family-firm samples but many do not.[6] Another difficulty in relating these works to the predictions of this paper is that most of the empirical corporate finance literature as focused on the effect of family ownership on performance. This paper argues that this effect is unconditionally ambiguous as family ownership has both positive and negative performance effects. The conditioning variables relevant to this paper's hypotheses have yet to be examined. However, some clinical research by Karra, Tracey, and Phillips (2006) seems consistent with the basic predictions of this paper. Karra, Tracy and Phillips find that family control increases cooperation is early stage firms but leads to conflicts as firms age and grow. Under the postulate that, in early stage firms, joint effort is key and liquid assets capable of being diverted are scarce while more mature firms generate large pools of liquid assets that can be diverted, their result

[5] The effect of kinship on policing opportunism modelled in my paper is in a more generic and reduced-from framework also modelled by evolutionary biologists studying the problem of how "policing strategies," can be favoured by natural selection. Policing strategies involve imposing punishments on agents who engage in non-cooperative behaviour even though imposing the punishment has adverse fitness consequences for the punisher. Gardner and West (2004) and El Mouden, West, and Gardner (2010) show that high levels of relatedness disfavour the selection of punishment strategies. Ratnieks (1988) finds evidence to support a negative association between relatedness and policing in a comparative study of Bumble Bee and Honey Bee behaviour.

[6] See Miller and Le Breton-Miller (2006) for a comprehensive summary of the various definitions of family firm used in the empirical literature.

is exactly what this paper's analysis predicts.

Perhaps the closest relatives of this paper are actually papers that do not model family firm behaviour but do model altruism. On stream of related literature is Becker (1974) and its descendants such as Bergstrom (1989). Like this paper, the subject of these models is family economic activity. However, unlike this paper, in these papers altruism is highly asymmetric—the parent is completely altruistic, maximising family utility, and the children are completely selfish. Allocations of family resources by the parent to the child are not contracted through an owner/manager relation but rather dictated by the parent. Allocations are not compensation but are gifts in that they are not contingent on the actions of the offspring and reflect only the parent's preferences over the distribution of offspring wealth. The main result in this literature is Becker's "Rotten Kid Theorem" which shows that, when effort is costless, offspring will have an incentive to work at the first-best level to maximise total family payoffs because increased family payoff will lead to their own allocation increasing. When the effort is costly, the "Lazy Rotten Kid" case analysed in Bergstrom (1989), the offspring will still exert some effort, though less than the first best level. Other papers in this literature have also attempted define more fully the class of parent preference functions over which the Rotten Kid Theorem holds. Because the Rotten Kid framework abstracts from compensation determination and contracting, few have attempted to apply its insights to the relationship between family owners and family managers. An exception to this general rule is Schulze, Lubatkin, and Dino (2003) which uses Becker's ideas to interpret his empirical analysis of the performance effect of family CEOs declaring their intent to sell the family firm.

Our other close relative is a paper that is not concerned with intrafamily behaviour at all— Lee and Persson (2010). Their paper models the effect on an unrelated principal of delegated monitoring when a worker and the worker's supervisor have altruistic preferences toward each other induced by friendship. Their model has an important technical similarity to ours—like ours, their model of altruism is symmetric and limited. In Lee and Persson, supervisors and workers are also motivated by an inherent aversion to the shame caused by a failure of their job performance to maximise the principal's welfare.[7] As the degree of friendship increases between the and supervisor the worker, the worker internalises the shame caused the supervisor from the supervisor failing to stop the worker's opportunistic behaviour. Thus, in their framework, friendship ties between agent and delegated monitor can increase the welfare of unrelated owners. In my analysis, both the principal and agent are directly connected with bonds of family altruism and both the principal and agent are shameless, considering only the payoff effects of their decisions on themselves and their fellow family members. This lack of shame leads to a much darker perspective on the effect of altruism on monitoring efficiency.[8]

[7] Their model of shame follows Benabou and Tirole (2006).

[8] At a more general level, the basic economic and financial market model used in this paper is related to a very large body of research in contract theory. The effort provision problem is modelled as an ex ante choice problem with ex ante incentive compatibility and reservation constraints as in, for example, Laffont (2002). The model of diversion follows, for example, Bolton and Scharfstein (1990) in assuming that managers can divert unverified cash flows. It resembles Townsend (1979) because in this analysis, like Townsend's, principals can pay a cost to verify cash flows. In contrast to Townsend, this model does not permit the principal to precommit to a verification strategy.

2 Model

2.1 Overview

The economy lasts for one period, bracketed by dates 0 and 1. There are two agents in the basic model: an owner and a manager. The owner has monopoly access to a project which we will call a firm. In extensions of the analysis, we consider the effect of external labour and capital markets on the owner/manager relation. In the baseline model, the owner can only operate the project if he secures the efforts of the manager and the owner and manager are related by kinship. For this reason we will refer an owner/manager pair who are kin as the "family owner" and "family manager" and other potential owners and manager as "external owners" and "external managers" respectively. Collectively, the family owner and family manager are called "family agents" and the total value received by these agents is called the "family" value. [9] We assume that consanguinity between agents leads them to partially internalise the effects of their actions on the payoffs to other family members. The specific mechanism governing this internalisation, borrowed from the theory of kin selection, is presented later.

In the baseline model, the family owner, assuming the firm operates, hires the family manager by making a first-and-final compensation offer to which the family manager can either accept or reject.[10] If the offer is rejected, the firm cannot operate and the family manager receives her reservation payoff. If the offer is accepted, the family manager makes an unobservable effort decision, which produces a cash flow. The cash flow is only observed by the family manager. The family manager then decides on the cash flow to report to the family owner. After observing the manager's report, the family owner decides whether to monitor the cash flow. Monitoring is costly but perfectly reveals the actual cash flow. Based on the realised cash flow, the report, and possibly information produced by monitoring, the cash flows of the firm are divided between the family agents. In the extensions section we consider two alternative formulations. In the first, there is an external managerial labour market which the family owner can tap if negotiations with the family manager fail. In the second, before the family owner makes a compensation offer, the family owner can sell a controlling stake to an external financier. If a control stake is sold, the external financier rather than the family owner makes the hiring and monitoring decision. The timing of events is summarised in Figure 1.

[9] The construction "family owner"is a bit awkward. However the plausible alternative terms to express genetic connection, relation and kin, are also problematic. "kin"is no a prepositive adjective, and in sentences describing mathematical relations between family agents actions and degree of relatedness, "relation" is even more awkward and perhaps even confusing, e.g., "the relation between relatedness and monitoring is increasing"

[10] See the final section of the paper, Section 9 for a discussion of the implications of this assumption.

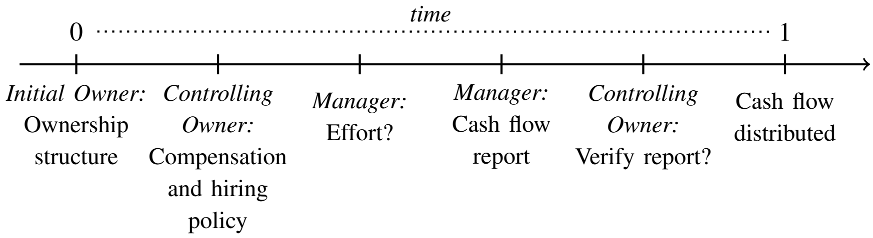


Figure 1: Timing of decisions in the model.

3 Specifics

3.1 Preferences

All agents are risk neutral and patient. Because agents are risk neutral, utility of external agents equals their expected payoff, which we will term their value and by v. The kin altruism preferences of family agents is reflected in their utility function, u:

$$u^{\text{Own}} = v^{\text{Own}} + h\, v^{\text{Relative}}, \quad 0 \leq h \leq 1/2. \tag{2}$$

where v^{Own} represents the agent's own value and v^{Relative} represents the relatives's value. The scalar h represents the strength of the relation, or family ties between the family agents. Note that agents are not altruistic in the sense of preferring relatives' gains to their own. If asked how they would split a fixed amount of money with a relative, each relative's preferred choice is to take everything for herself. However, relatives may abstain from such transfers when the transfers are highly dissipative, i.e. the transfer to one from one to another significantly reduces total family value. This observation is most apparent if we rewrite the utility function using to equivalent formulations. Let $V^{\text{Family}} = v^{\text{Own}} + v^{\text{Relative}}$ represent total family value. Then we can also express the utility function of a family agent in the following three forms:

$$u^{\text{Own}} = V^{\text{Family}} - (1-h)\, v^{\text{Relative}}, \tag{3}$$

$$u^{\text{Own}} = (1+h)\, V^{\text{Family}} - u^{\text{Relative}}, \tag{4}$$

$$u^{\text{Own}} = h V^{\text{Family}} + (1-h)\, v^{\text{Own}}. \tag{5}$$

These reformulations of utility function show that across choices that leave the either the utility or the payoff of kin fixed, agents prefer the decision that maximises family value. This is not very surprising observation, but it will prove useful in the subsequent analysis.

3.2 Effort

The random cash flow from the project, $\tilde{x}$, has the following distribution

$$\tilde{x} = \text{dist.} \begin{cases} \bar{x}, & \text{w.p. } p \\ 0 & \text{w.p. } 1-p \end{cases} . \tag{6}$$

The manager selects $p \in [0, \bar{p}]$. The manager's choice of p imposes a non-pecuniary effort cost of $K(p)$ on the manager, where K is a weakly increasing function of p. Effort is not observable by any agent accept the manager. If the firm fails to operate the project produces a payoff of 0, and the manager receives a payoff of v_R, the manager's reservation payoff.

3.3 Reporting and monitoring

After the cash flow is generated, the manager sends a message to the owner, in the baseline model the family owner. This message is only observed by the owner. By the revelation principle, we can assume that the message is a report a cash flow of 0 or a cash flow of $\bar{x}$. We call this report, "reported income." If the owner does not monitor, reported income equals income. If the owner monitors, income equals the actual cash flow. Monitoring cannot be verified and the report is observed only by the owner. Income is transferred by the manager to the owners, and then distributed to the owners and the manager. Because reported income must be transferred, reported income can never exceed cash flows. Thus, when the firm's cash flow is 0, the manager always reports 0. If the cash flow is $\bar{x}$ the manager can report either 0 or $\bar{x}$. The manager's compensation is based on reported income. Because payments to the manager satisfy limited liability in reported income, the payment received after a report of 0 always equals 0.

3.3.1 Parameter restriction

Throughout the analysis, we impose the following parameter restrictions:

$$\max_{p \in [0,\bar{p}]} p\bar{x} - (v_R + K(p) + c) > 0, \tag{7}$$

$$(1-h)\bar{x} - c > 0. \tag{8}$$

(7) implies that the expected cash flow to the project exceeds the cost of effort, monitoring, and the manager's reservation payoff. Thus, absent any kinship between the agents, undertaking the project is optimal even if undertaking the project requires the owner to incur the monitoring expenditure, c. The second restriction implies that the family owner's utility benefit from monitoring, which equals the gain from transferring a concealed cash flow

of $\bar{x}$ from the manager to the owner, $(1-h)\bar{x}$, exceeds the cost of monitoring, c. If this assumption were violated, the family owner would never monitor and the family manager would divert the entire cash flow.

3.4 Actions

3.4.1 Owner

The owner makes a compensation offer decision and a monitoring decision. Under the parametric assumptions of the model (see Section 3.3.1 below), it is always optimal to hire a manager to run the firm and thus we do not consider the decision of whether to operate in the sequel. The compensation decision is the choice of a compensation contract for the manager. We assume limited liability for both agents. This assumption, combined with the fact that only one positive cash flow is possible, implies that the compensation takes the form of a payment $w \in [0, \bar{x}]$ made to the manager if and only if manager reports $x = \bar{x}$.[11]The owner also makes a monitoring decision, whether to monitor the manager's report of a zero cash flow. The owner cannot commit to a monitoring decision ex ante. Monitoring costs are paid by the firm. The payoff to the owner will equal the residual cash flow remaining after compensation and monitoring costs. We call the expected payoff to the owner the owner's value or firm value and represent the owner's value with v_O

3.4.2 Manager

The manager makes three decisions. The first is whether to accept the owner's employment offer. The second decision is whether to exert effort. The third is the reporting decision, i.e., when the cash flow is equal to $\bar{x}$, whether to report $\bar{x}$ or 0. The manager cannot commit to a reporting policy but rather makes the reporting decision after observing the cash flow. The payoff to the manager consists of compensation received plus diverted income less effort costs. We call the expected payoff to the manager the manager's value and represent it with v_M. The payoffs, to the manager and firm, excluding managerial effort costs, for a fixed compensation policy w are depicted in Figure 2. The division of cash flows between the owner and manager produced by the monitoring and underreporting decisions is represented in Table 3.4.2

[11]For reasons to those given in Townsend (1979), it is never optimal to offer the manager a positive payment when she reports $x = 0$ and monitoring verifies $x = \bar{x}$

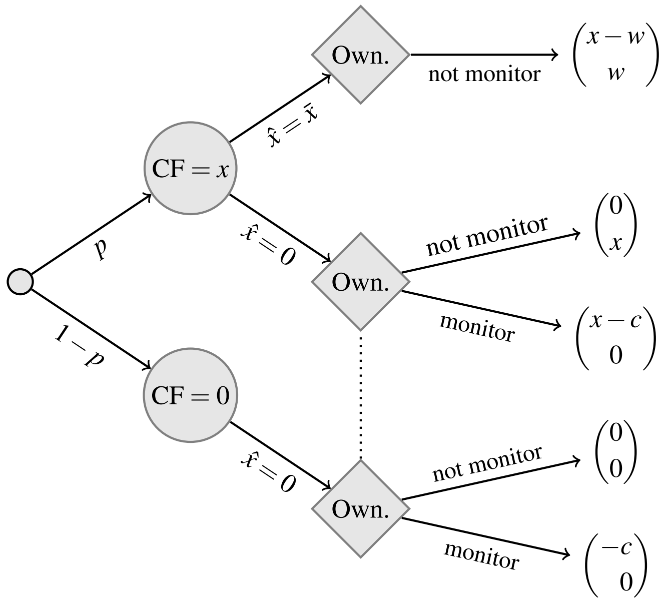


Figure 2: The payoffs to the manager and owner, excluding the manager's non-pecuniary effort costs, are represented by the end points of the tree. The top number in each array represents the owner's payoff and bottom number represents the manager's payoff. The dotted line represents the owner's information set at the time the monitoring decision is made.

	$x=0$		$x=\bar{x}$		
	$\hat{x}=0$		$\hat{x}=0$		$\hat{x}=\bar{x}$
	Not Monitor	Monitor	Not Monitor	Monitor	Not Monitor
Cash Flow	0	0	$\bar{x}$	$\bar{x}$	$\bar{x}$
Reported Cash Flow	0	0	0	$\bar{x}$	$\bar{x}$
Compensation	0	0	0	0	w
Unreported Income	0	0	$\bar{x}$	$\bar{x}$	0
Diversion	0	0	$\bar{x}$	0	0
Pmt. to Owner	0	$-c$	0	$\bar{x}-c$	$\bar{x}-w$
Pmt. to Manager	0	0	$\bar{x}$	0	w

Table 1: Cash flows, payments to the manager and owner

4 Internalisation of joint gains: The bright-side scenario

As will become more apparent as we develop the model fully, kinship has a number of distinct effects on firm efficiency, as well as manager and owner welfare. In the most general formulation of the model, these effects are difficult to disentangle. Thus, we will begin our analysis by imposing parametric assumptions that isolate the positive and negative effects of family control. We first consider the case where the reservation wage constraint is not binding and monitoring is costless. This is the "bright side" scenario for family control. Next, we consider the opposite case, where the monitoring problem is predominant and limited liability and the managerial reservation constraint fix compensation. This is, as we shall see, the "dark-side scenario" for family control. Finally, primarily through numerical simulations, we explore the general case where monitoring is a significant problem and but the effort incentive compatibility conditions fix managerial compensation. We will see that the results in the general case will depend on whether the positive or negative effects dominate.

To implement the bright-side scenario model, we assume that $c = 0$ and $v_R = 0$. Under these assumptions, monitoring is costless and thus the monitoring subgame has a trivial solution—the owner monitors with probability 1 and the manager does not underreport; incentive computability and limited liability are the binding constraints. We also assume in this section, that the output/effort relation takes the following simple form:[12]

$$K(p) = {}^{1\!}/_{2}\, k\, p^2, \quad p \in [0, \bar{p}], \bar{p} \leq \bar{x}/k. \tag{9}$$

If the manager works for the firm, the wage level is w, and success probability is p, the value to the manager v_M and family owner v_O are given as follows:

$$\begin{aligned} v_M &= pw - {}^{1\!}/_{2}\, k\, p^2, \\ v_O &= p(\bar{x} - w), \end{aligned} \quad p \in [0, \bar{p}] \text{ and } w \geq 0. \tag{10}$$

The utilities of the manager and owner are given by

$$\begin{aligned} u_M &= pw - {}^{1\!}/_{2}\, k\, p^2 + h\,(p(\bar{x} - w)), \\ u_O &= p(\bar{x} - w) + h\,(pw - {}^{1\!}/_{2}\, k\, p^2) \end{aligned} \quad p \in [0, \bar{p}] \text{ and } w \geq 0,]. \tag{11}$$

If the manager refuses to accept employment, the firm cannot operate and thus the payoffs to the manager and owner both equal 0 and thus their utilities equal 0.

The manager's effort problem is given by

$$\max_{p \in [0, \bar{p}]} u_M \tag{12}$$

The solution to this problem is

$$p^*_M(w) = \min\left[\frac{w\,(1-h) + \bar{x}\,h}{k}, \bar{p}\right]. \tag{13}$$

Define p_0 by

$$p_0 = p^*_M(0) = \frac{\bar{x}\,h}{k}. \tag{14}$$

Note that p_0 is the probability of success, i.e., realising $\bar{x}$, given the lowest possible level of managerial compens-

[12] The upper bound imposed $\bar{p}$ is not required to obtain any of the results. The bound simply rules out effort levels that are so high that they lower total family welfare. Such effort levels are never optimal. By ruling out these effort levels we shorten some of the proofs.

ation, 0. The function p^*_M is strictly increasing thus we can define the inverse map

$$w^*_M(p) = \frac{k\,p - h\bar{x}}{1-h}, \quad p \in [p_0, \bar{p}]. \tag{15}$$

Provided $[p_0, \bar{p}]$ is non empty, we can thus formulate the family owner's problem as choosing, $p, w^*_M(p)$ combinations to maximise the owner's utility subject to the manager's reservation constraint. However, given our assumption that the reservation compensation is 0, the reservation constraint is not binding. Thus, using expressions (15) and (11), we can write the family owner's problem as

$$\max_{p\in[p_0,\bar{p}]} p(\bar{x} - w^*(p)) + h\,(p\,w^*(p) - {}^1\!/_2\,k\,p^2). \tag{16}$$

Note that if we evaluate the derivative of the objective function, given in (16) we obtain:

$$(h+1)\,\bar{x} - (h+2)\,k\,p. \tag{17}$$

If we evaluate this expression at p_0 we see that it is positive for $h \leq {}^1\!/_2$ thus the optimal choice of p will either be in the interior of $p_0, \bar{p}]$ or will equal the upper endpoint, $\bar{p}$. The fact that the first-order condition is positive at p_0 and the definition of p_0 given by expression (14) combined with the fact that $\bar{p} \leq \bar{x}/k$ implies that the optimal solution to the owner's problem, p^*_O satisfies the following inequalities:

$$p^*_O\,k - \bar{x} \leq 0 \quad \text{and} \quad p^*_O\,k - h\bar{x} \geq 0. \tag{18}$$

Solving the first-order condition shows that inside owner's optimal choice, p^*_O, if the interval $[p_0, \bar{p}]$ is not empty, is given by

$$\min\left[\frac{(h+1)\bar{x}}{(h+2)k}, \bar{p}\right] \quad h \in [0, {}^1\!/_2]. \tag{19}$$

The interval is empty if and only of $\bar{p} < p_0$. If the interval is empty, the highest feasible p is attained at a 0 compensation level. Thus, the optimal solution is to set $p = p_0$. Combining this observation with expression (19) shows that the optimal choice for the family owner is defined by

$$p^*_O = \max\left[p_0, \min\left[\frac{(h+1)\bar{x}}{(h+2)k}, \bar{p}\right]\right], \quad h \in [0, {}^1\!/_2]. \tag{20}$$

If the owner managed the firm himself, and thus internalised all of the benefits and costs of undertaking the project, the owner would set $p = \min[x/k, \bar{p}]$. This first-best level of effort is never attained under management by the family manager as can be seen through inspecting (19). However, it is equally apparent that kinship leads to a higher level of output than would be attained if the manager was not kin and that the level of output is increasing in kinship.[13] There are two drivers of the welfare gains from kinship. The first, which has a standard analog the principal-agent literature, is that the manager internalises firm gains through kinship, in a sense the family manager has an implicit ownership stake in the owner's profits engendered by kinship. Thus, the manager even without explicit performance based compensation, acts as if she is a partial owner of the firm. The other effect, which is somewhat different than that found in standard agency models is that the owner acts as if he partially "owns" the manager's pay check. Increasing p increases total output at the cost of raising compensation and thus increasing the fraction of output captured by the manager. Thus, the partial internalisation of the manager's compensation gain induces the owner to be more willing to sacrifice firm profits for the sake of increasing overall output. This observation is illustrated in Figure 3

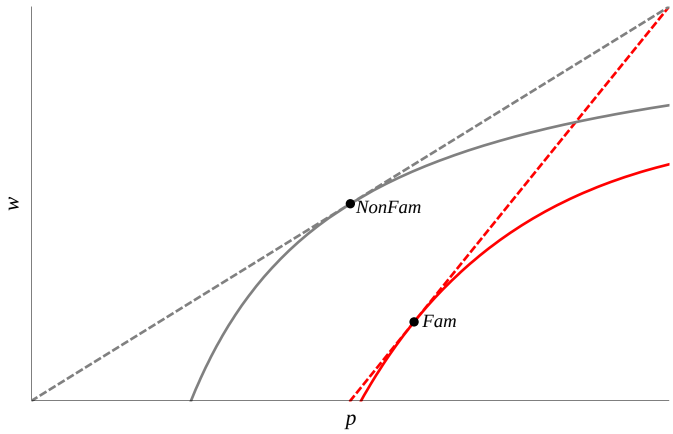


Figure 3: The effect of kinship on output and compensation in the costless monitoring framework. In the figure, equilibrium levels of compensation, w, and success probability, p, are plotted for family and non-family firms. The grey lines represent the non-family firm, i.e., the case where $h = 0$. The black lines represent the family firm, i.e., $h > 0$. The dashed lines represent the combinations of p and w which are incentive compatible. The solid lines represent the indifference curves of the owner. The point labeled "Fam" represents the solution for the family firm; The point labeled "NotFam" represents the solution for the non-related firm.

Given the intuition developed above the following results are not too surprising.

Proposition 1. *In the bright-side scenario, total output and the value of the firm are weakly increasing in degree of kinship between the owner and the manager and are strictly increasing whenever the success probability p_O^* is in the interior of the feasible range. The manager's value is weakly decreasing in kinship and is strictly decreasing whenever p_O^* is in the interior of the feasible region.*

Proof. See appendix. □

[13] In fact, inspecting the equation seems to indicate that even if $h = 1$, the probability of success might fall below the first best level. However, this conjecture is not correct as it fails to take into account the parameter restriction, $h < 1/2$. If we evaluate equation (17) at p_0 as defined in (14), we see that for all $h > 1/2(\sqrt{5} - 1) \approx 0.618$ (17) is negative at p_0, implying that the optimal solution to the owner's problem calls for $p = p_0 = h(\bar{x}/k)$ which indeed converges to the first best solution as $h \to 1$.

5 The monitoring subgame when monitoring costs are positive

In this section, we analyse the monitoring/reporting subgame in the case where the game is not trivial, when the cost of monitoring c is positive. In this case, monitoring is costly and will only be undertaken when the gains from monitoring exceed its cost. The gain from monitoring depends on the likelihood managers attempt diversion by underreporting. Managerial underreporting will depend, in turn, on the likelihood of monitoring. In equilibrium, monitoring and underreporting will be simultaneously determined. Our aim is to investigate the effect of kinship on the equilibrium outcome of this subgame.

5.1 Incentives to underreport

When the cash flow equals $\bar{x}$ and the manager reports $\bar{x}$, she receives w and the owner receives $\bar{x}-w$. If the manager reports 0, and the owner does not monitor, the manager receives $\bar{x}$ and the owner receives 0. If the owner monitors, the manager receives 0 and the owner receives $\bar{x}-c$. Thus, conditioned on underreporting, the family manager's utility is

$$u_M^{\text{Underreport}} = (1-m)\,\bar{x} + h\,m\,(\bar{x}-c), \tag{21}$$

and conditioned on truthfully reporting $\bar{x}$, the family manager's utility is

$$u_M^{\text{NotUnderreport}} = w + h(\bar{x}-w). \tag{22}$$

Thus, the family manager's best reply is to divert if $m < m^*$, not divert if $m > m^*$, and, both diversion and non-diversion are best responses if $m = m^*$, where m^* is determined by equating (21) and (22), which produces

$$m^* = \frac{(1-h)(\bar{x}-w)}{c\,h + (1-h)\bar{x}}. \tag{23}$$

5.2 Incentives to monitor

Let ρ represent the family owner's posterior assessment of the probability that the cash flow is $\bar{x}$ conditioned on the family manager reporting 0. Later we will determine this posterior using Bayes rule. If the owner monitors, the owner's will receive $-c$ if the cash flow is 0 and $\bar{x}-c$ if the cash flow is $\bar{x}$. Thus, the family owner's payoff from monitoring is

$$\rho\,\bar{x} - c. \tag{24}$$

If the family owner decides not to monitor, his payoff is 0. Now consider the family manager's payoff conditioned on a report of 0. If the cash flow is actually 0, the family manager's payoff is 0 regardless of the owner's monitoring decision, if the cash flow is $\bar{x}$ the manager receives $\bar{x}$ if the owner does not monitor, and 0 in the family owner monitors. Thus, the utility to the family owner from monitoring, reflecting both his payoff and the family manager's payoff as specified in (2). It is given by

$$u_O^{\text{Mon.}} = \rho\bar{x} - c. \tag{25}$$

If the family owner does not monitor, the family owner's utility is given by

$$u_O^{\text{NotMon.}} = h\rho\,\bar{x}. \tag{26}$$

Thus, the family owner's best reply is to monitor if $\rho > \rho^*$ not monitor if $\rho < \rho^*$; both monitoring and not monitoring are best replies if $\rho = \rho^*$, where

$$\rho^* = \frac{c}{(1-h)\,\bar{x}}. \tag{27}$$

Let σ represent the probability of the family manager reporting 0 conditioned on the cash flow being $\bar{x}$. The cash flow distribution under effort (which is given by (6)) and Bayes rule imply that ρ, the probability that the cash flow equals $\bar{x}$ conditioned on a report of 0, is given by

$$\rho = \frac{\sigma\,p}{\sigma\,p + (1-p)}. \tag{28}$$

5.3 Equilibrium in the monitoring/reporting subgame

To determine the equilibrium, we first impose the following parametric restriction:

$$(1-h)\,\bar{x}\,p > c. \tag{29}$$

Assumption (29) is simply imposed to ensure that, in the subgame, the probability of success, p, is sufficiently high to ensure that monitoring is a best reply to a managerial strategy of always attempting diversion by underreporting cash flows. To determine the equilibrium in the reporting subgame, first note that no equilibrium exists in which monitoring occurs with probability 1: if monitoring did occur with probability 1, then the family manager would never underreport. In which case, monitoring would not be a best response for the family owner. Next, note that the highest possible value of ρ, produced by the conjecture that the manager always underreports, is p. Thus, assumption (29) ensures that for a sufficiently high probability of underreporting, the owner will monitor. If assumption (29) were not satisfied, then the owner will never monitor and the subgame equilibrium solution would be for the manager to divert with probability 1. Thus, there is a unique mixed strategy equilibrium in the reporting/monitoring subgame in which (28), (23) and (27) are all satisfied. The equilibrium probabilities of underreporting, σ^*, and monitoring reports of 0, m^*, in this mixed strategy equilibrium are given by

$$\sigma^* = \frac{c\,(1-p)}{p\,(\bar{x}(1-h)-c)}, \quad m^* = \frac{(1-h)(\bar{x}-w)}{c\,h+(1-h)\,\bar{x}}. \tag{30}$$

We see from equation (30), that monitoring is decreasing in kinship, h, while managerial underreporting is increasing in h. This implies that diversion is larger when kinship is higher. At first glance this result seems odd, why should managers steal more when kinship is high? The result follows from the nature of diversion. Diversion is an intra-family transfer and monitoring is costly to the family as it lowers the family's total value. As the strength of the kinship relation increases, the family owner internalises more of the manager's gain from underreporting and, thus, the level of expected managerial underreporting required to induce monitoring also increases. At the same time, underreporting, by triggering monitoring, increases expected monitoring costs, and the manager internalises these monitoring cost in proportion to kinship. Thus, as kinship increases, the level of monitoring required to deter diversion falls.

Since kinship both (a) increases underreporting, (b) reduces the probability that 0 reports will be monitored, the combined effect of (a) and (b) determines kinship's effect on the unconditional probability of monitoring. The fall in m^* induced by an increase in kinship implies that a report of 0 is less likely to be monitored. At the same time, the increase in σ^*, also induced by an increase in kinship, implies that as kinship increases the probability of a report of 0 increases. Since monitoring occurs if and only if a report of 0 is made and the report is monitored, the effect of kinship on the probability of monitoring is not obvious at first glance. However, explicit calculation of the equilibrium total probability of monitoring, given by $\mathrm{PM}^* = m^*(1-p(1-\sigma^*)$, shows that

$$\mathrm{PM}^* = m^*(1-p(1-\sigma^*)) = \frac{(1-h)^2(1-p)x(x-w)}{((1-h)x-c)(ch+(1-h)x)}, \tag{31}$$

which is an increasing function of h. These observations establish the following proposition.

Proposition 2. *There is a unique equilibrium level of monitoring and underreporting for the monitoring/reporting subgame conditioned on a given compensation level. In this equilibrium, the probability of monitoring 0 reports, m^*, and underreporting, σ^* are given by equation* (30). *In the equilibrium, the probability of*

a. Underreporting is increasing and convex in kinship, h,

b. Monitoring of 0 reports is decreasing and concave in kinship h.

c. The total probability of monitoring occurring is increasing in kinship, h.

d. The probability of successful diversion is increasing in kinship, h.

Thus, at any fixed compensation level, kinship increases both diversion and costs of monitoring, which are proportional to the probability of monitoring. This result follows because strengthening the bonds of kinship reduces the welfare loss to the family owner from diversion of firm resources by his kin—the manager. This weakens monitoring incentives. Weaker monitoring incentives leads to more underreporting and thus more reports of low cash flows. Since monitoring only occurs after low reports, this leads to a higher total probability of monitoring even though conditional on a low report being made, the probability of monitoring is lower. Since the only dissipative cost faced by the family as a whole is monitoring costs, strengthening the kinship relation between the owner and manager lowers total family payoffs. These observations are illustrated in Figure 4 below.

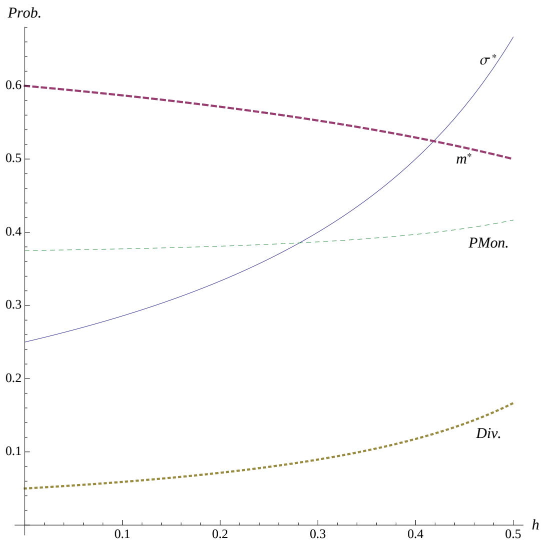


Figure 4: The probability of underreporting, σ^* (represented by the solid line), monitoring reports of 0, m^* (represented by the thick dashed line), managerial diversion, *Div.*, (represented by dotted line), and monitoring occurring, *PMon.* (represented by the thin-dashed line), as a function of kinship, h, for a fixed compensation policy. In the graph, $c = 0.2$, $p = 0.5$, $x = 1.0$, and $w = 0.4$.

Note that Proposition 2 was established for subgames in which compensation has already been fixed. In equilibrium, compensation is endogenously and fixed by the family owner subject to the reservation, incentive compatibility, and limited liability constraints. As we will show in the next section, endogenous determination of compensation can actually increase the total welfare loss from kinship.

6 Loyalty holdups and the dark side

In the bright-side scenario we abstracted from the monitoring problem by assuming that monitoring costs equaled 0 but effort was costly. This produced the most favourable case for family ownership from an overall welfare perspective—the bright-side scenario. In this section, we abstract from the ex ante effort problem by assuming that effort costs are 0 but monitoring is costly. We call this case the "dark-side scenario." The specific parametric assumptions we impose are as follows:

$$K(p) = 0, \tag{32}$$

$$v_R > 0, \tag{33}$$

$$(1-h)\bar{x}\,\bar{p} > c, \tag{34}$$

$$\bar{x}\bar{p} - v_R > c. \tag{35}$$

Equation (32) sets effort costs to 0 and inequality (33) ensures the reservation value of the manager is positive. Under these assumptions, the manager will choose the highest feasible success probability, $\bar{p}$. Inequality (34) insures that the general condition (29) is satisfied and thus the owner's monitoring costs are not so high that no monitoring will occur. Inequality (35) ensures that the general condition (7) is satisfied and thus the project has positive value.

6.1 Compensation

In this section, we determine the equilibrium level of compensation. As specified in Section 3.2, no output can be produced without managerial effort. Thus, the owner will always offer sufficient compensation to ensure effort and retain the manager. Since effort is costless in the dark-side scenario being analysed here, the manager will always exert effort if she accepts employment.

If the family manager accepts employment, the cash flow to her either equals $\bar{x}$ or 0. If the cash flow equals $\bar{x}$, her utility is as given in the subgame described in Proposition 2. If the realised cash flow is 0, the family manager's payoff is 0 and the family owner's payoff equals the losses from monitoring the family manager's 0 cash flow report, given by $-m^*c$. Thus, the family manager's utility is

$$u_M^* = \bar{p}\,(w + h\,(\bar{x} - w)) - (1-\bar{p})h\,m^*\,c. \tag{36}$$

The family owner's utility is determined in like fashion. The family owner's utility is given by the expectation over the two possible reports 0 and $\bar{x}$. If 0 is reported, the owner's utility is given by the mixed strategy equilibrium in the reporting/monitoring subgame. Since the utility to the owner is the same whether he monitors or does not monitor in the subgame, the utility of the owner after a report of 0 equals the owner's utility after a report of 0 given the owner does not monitor. This is given by $h\rho^*\bar{x}$. The probability of a 0 report is $1-(1-\sigma^*)\,\bar{p}$. If the manager reports $\bar{x}$, which occurs with probability $(1-\sigma^*)\,\bar{p}$, the owner's utility is $\bar{x}-(1-h)\,w$. Thus, the utility of the owner is given by

$$(1-(1-\sigma^*)\,\bar{p})(h\rho^*\bar{x}) + ((1-\sigma^*)\,\bar{p})(\bar{x}-(1-h)\,w). \tag{37}$$

Using equation (28) we can simplify this expression to

$$u_O^* = \bar{p}\,((1-\sigma^*)(\bar{x}-(1-h)\,w)+\sigma^*\,h\bar{x})\,. \tag{38}$$

From (30) and (38), and (34) it is clear that, despite kinship, the family owner's utility is decreasing in the level of managerial compensation. For this reason the family owner will never set compensation higher than the level required to satisfy the family manager's reservation constraint. If the family manager does not work for the firm she earns v_R and the family owner's payoff is 0. Thus, minimum managerial compensation satisfies

$$\bar{p}\,(w+h\,(\bar{x}-w))-(1-\bar{p})\,h\,m^*\,c = v_R. \tag{39}$$

Solving this equation for w, yields the minimal compensation to the family manager required to ensure the reservation constraint is satisfied:

$$\frac{v_R}{\bar{p}} - \frac{h((\bar{p}\bar{x}-v_R)((1-h)(\bar{p}\bar{x}-c)+c\bar{p}))}{(1-h)\bar{p}(ch+(1-h)\bar{p}\bar{x})}. \tag{40}$$

There is an additional constraint on compensation, limited liability, which requires a positive payment to the family manager. Thus, in order to obtain the equilibrium level of compensation we need only impose the limited liability condition:

$$w_M^* = \max\left[\frac{v_R}{\bar{p}} - \frac{h((\bar{p}\bar{x}-v_R)((1-h)(\bar{p}\bar{x}-c)+c\bar{p}))}{(1-h)\bar{p}(ch+(1-h)\bar{p}\bar{x})}, 0\right]. \tag{41}$$

As long as the limited liability constraint is not binding, increasing kinship, reduces the equilibrium compensation level, w_M^*. This result is recorded and demonstrated below.

Proposition 3. *w_M^* is weakly decreasing in the kinship bond between owner and manager, h and, whenever $w_M^* > 0$, w_M^* is a smooth strictly decreasing convex function of h.*

Proof. See the Appendix. □

The negative effect of kinship on compensation results from a "loyalty hold-up." Because the management skills for the project are firm specific, if the family manager refuses to work for the family firm, project cash flows are lost, which harms the family as a whole. The manager internalizes the family's losses and thus will be reticent to reject even low salary offers from the owner. Thus, the firm-specific nature of the skills required to run the firm actually weaken the bargaining position of the family member possessing these unique skills. Reducing firm specificity of management skill reduces the gains to owners resulting from loyalty holdups.

6.2 Efficiency

In Section 5.3 we showed that total monitoring increases with kinship at a fixed wage. In Section 6.1 we showed that increased kinship leads to lower compensation. Reductions in compensation, absent diversion attempts by the manager, increase the size of the owner's residual claim, $x - w$. The gain from diversion relative to non-diversion is exactly this residual share. Thus, lowered compensation makes underreporting more attractive at a any fixed monitoring policy. Hence, reductions in compensation, require increases in monitoring to deter diversion. Combining these two observations makes the logic behind the following proposition apparent.

Proposition 4. *(a) Whenever $w_M^* > 0$, the probability that the family owner will monitor the manager's report of a zero cash flow is strictly increasing in kinship.*

(b) The total probability of monitoring is increasing in kinship

(c) Total family value is decreasing in kinship

Proof. See the Appendix. □

Note that both when compensation is fixed, the case considered in section 5.3, and in the analysis of this section, kinship increases the unconditional probability of monitoring. However in the fixed compensation case, the probability of monitoring conditioned on a report of 0 falls as the degree of kinship increases. The increase in the total probability of monitoring occurs in the fixed compensation case because the reduced conditional probability of monitoring 0 reports is swamped by the increase in the likelihood of 0 reports. However, when the manager's reservation constraint binds, compensation varies with kinship and the loyalty hold up effect ensures that even the conditional probability of monitoring increases with kinship. Thus, while kinship increases the probability of inefficient monitoring even when compensation is fixed by the limited liability constraint, the probability of monitoring will be much more responsive to increases in the degree of kinship when the reservation constraint binds. In other words, the value loss created by increased kinship is largest when the reservation constraint binds and thus the loyalty holdup can be effected.

6.3 Value

Next we consider the value effects of kinship. The family manager does not aim to maximise the value of her employment relation with the firm nor does the family owner aim to maximise the firm's value, rather both of these family agents aim to maximise their utility which partially internalises the gains to fellow family members. However, the actions of the family owner and manager, which vary with their degree of kinship, have valuation effects. The effect of kinship on valuation depends both on kinship's effect on efficiency was well at its effect on the distribution of value between the manager and the owner. Because of these distributional effects, kinship may increase firm value even under the dark-side scenario where it lowers total family value.

6.3.1 Firm value

Equations (41), (30), and (38), determine the owner's equilibrium value, v_O^*, which is given by

$$v_O^* = \bar{p}\,(m^*\,\bar{x}\,\sigma^* + (1-\sigma)\,(\bar{x} - w_M^*)) - c\,m^*(1 - \bar{p}\,(1-\sigma^*)). \tag{42}$$

where σ^* is defined by (30) and w_M^* by (41).

From Propositions 2 and 2, we see that increasing the degree of kinship will (i) lower compensation, (ii) increase underreporting, and (iii) increase monitoring. Effect (i) increases firm value while effects (ii) and (iii) lower firm value. For this reason, the relation between firm value and kinship is, in general, neither monotone nor concave. However, the relation between kinship and value is strictly quasiconcave. Hence, the relation is always unimodal. Whether the value-maximising degree of kinship is interior depends on the degree of uncertainty regarding firm cash flows and the costs of monitoring relative to the total expected operating cash flows. These observations are formalised in Proposition 5.

Proposition 5. *a. The value of the firm is a quasiconcave function of kinship, h.*

b. Let $\gamma = c/(\bar{p}\bar{x})$, then

i. if

$$(1-\gamma)^2 - \gamma^3\,(((1-\bar{p}) - \gamma)\,(\bar{p} - \gamma) + (1-\gamma)\,\gamma) > 0, \tag{43}$$

There exists a unique positive level of kin relatedness, which maximises the value of the firm.

ii. If

$$(1-\gamma)^2 - \gamma^3\,(((1-\bar{p}) - \gamma)\,(\bar{p} - \gamma) + (1-\gamma)\,\gamma) \le 0, \tag{44}$$

then the value of the firm is maximised at when the manager is not related to the owner, i.e., $h = 0$

The region of the parameter space over which kinship increases value is presented in Figure 5

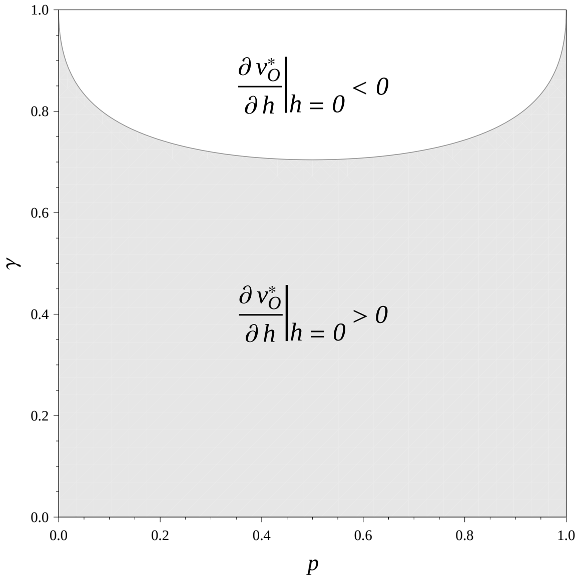


Figure 5: The horizontal axes represents γ, monitoring cost as a fraction of total firm value. The vertical axis represents $\bar{p}$, the probability of a high cash flow given effort.

Proposition 5 shows that the answer to the question of whether kinship can increase value depends only on the cost of monitoring as a proportion of the total expected operating ash flows, γ and the probability of a positive cash flow given effort, $\bar{p}$. The fact that some level of kinship increases value does not preclude higher levels of kinship from destroying value. If fact, a sufficiently a high degree of kinship may make credible monitoring impossible and thus prevent owners from extracting any value from the project. However, despite these limitations, the proposition does reveal that family firms may have higher values than otherwise identical non-family firms even when family firms are inefficient. In these cases, the firm's gain in value from the loyalty holdup exceeds its loss from inefficient monitoring. Figure 6 presents fairly representative illustrations of the possible relations between firm value and kinship under the dark-side scenario.

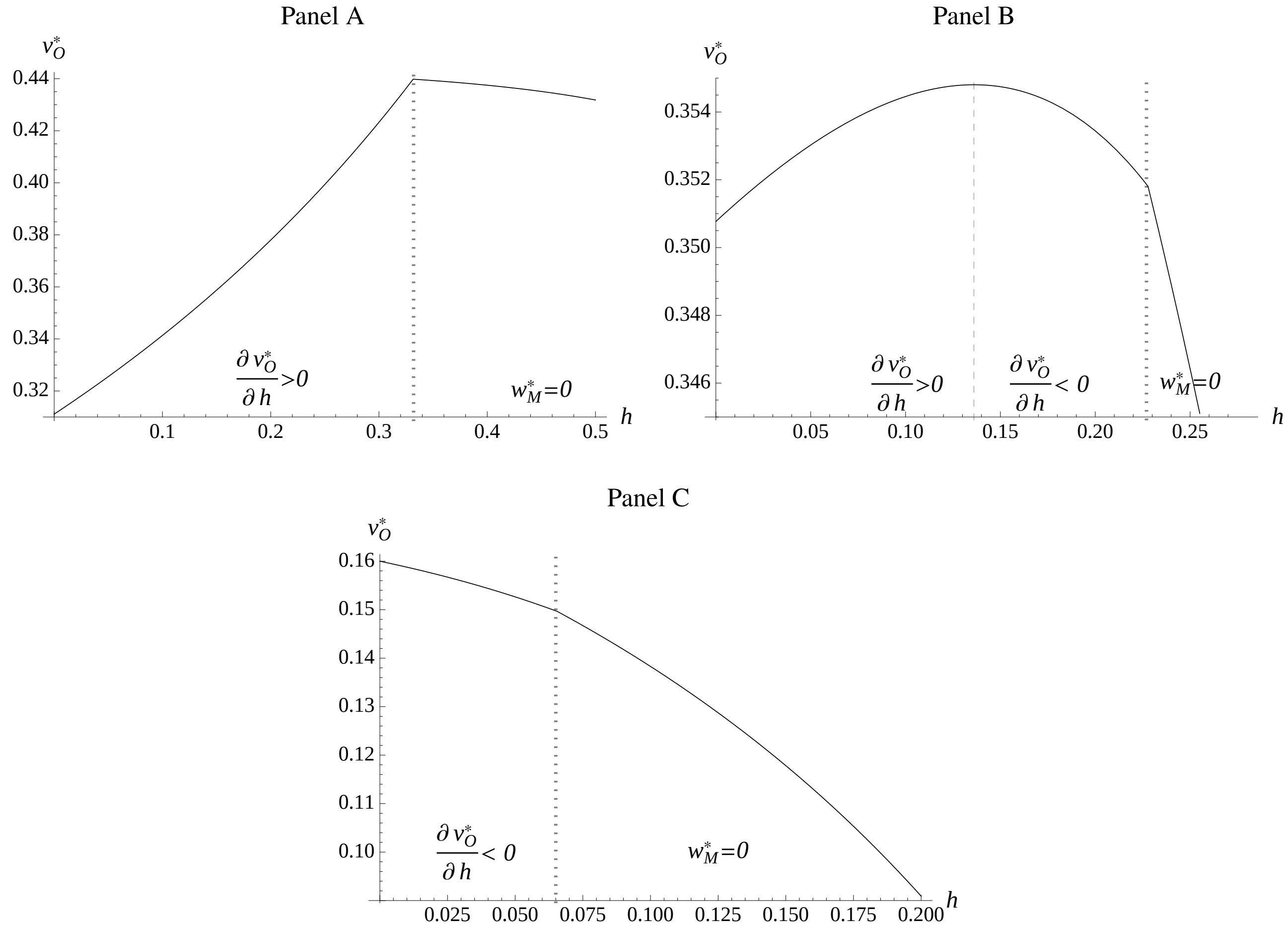


Figure 6: Effect of kinship on firm value at a sample of admissible model parameters. In each of the figures, the degree of kinship is plotted on the horizontal axis, h, and firm value is plotted on the vertical axis. The region labeled $\partial v_O^*/\partial h > 0$ represents the region where firm value is increasing with in the degree of kinship between the owner and manager. The region labeled $\partial v_O^*/\partial h < 0$ represents the region where firm value is decreasing in kinship and the managerial compensation exceeds 0. The region labeled $w^* = 0$ represents the region where managerial compensation equals 0. As the graphs suggest, the relation between kinship and firm value is quasiconcave.

6.3.2 The manager's value

The manager's value, which, because in the dark-side scenario there are no effort costs, is just the expected cash flow received by the manager, is given by

$$v_M^* = \bar{p}\,((1-m^*)\,\sigma^*\,\bar{x} + (1-\sigma^*)\,w_M^*). \tag{45}$$

The effect of kinship on the manager's value function is somewhat subtle. Recall, that the reservation constraint is always binding at the equilibrium compensation contract if the limited liability constraint can be satisfied at a compensation level that makes this constraint bind. However, this condition only ensures that the manager's utility from accepting employment is constant. Since, utility incorporates internalised family gains, it is not identical to value. The manager's value is produced by two components: formal compensation and cash flows appropriated through diversion. Increasing the degree of kinship always weakly lowers compensation, but at the same time, it also increases diversion. Thus, the effect of kinship on the manager's value is determined by the balance of these two effects. When the degree of kinship is low, the compensation reduction effect always dominates, and increasing the degree of kinship lowers the manager's value. However, increasing the degree of kinship from a sufficiently high starting point can actually increase the manager's value. This reversal can occur for two reasons, one fairly obvious and the other subtle. The obvious reason is that compensation has been lowered so much by kinship that it has hit the limited liability boundary. In which case, the manager clearly earns positive rents as the degree of kinship increases because her compensation cannot fall and equilibrium diversion increases. But this is not the only mechanism through which increasing the degree of kinship increases the manager's value. Increases in value can also occur when the reservation constraint is binding. The condition for such increases is that the value of the project, measured by $\bar{p}\bar{x} - v_R - c$ is sufficiently low. The logic behind the reversal is that although an increased degree of kinship increases the fraction of the family's gain the manager internalises and thus uses to satisfy her reservation constraint, the increase in kinship also increases monitoring and thus lowers the total family gain. Thus, at a higher degree of kinship, the manager has less family gain to internalise into her utility function. And thus, to keep her utility constant, her direct gains from diversion must increase. These results are recorded in the following proposition:

Proposition 6. *For degrees of kinship h such that the monitoring constraint $(1-h)\,\bar{p}\bar{x} > c$ is satisfied,*

(a) The manager's value is strictly quasiconvex in the degree of kinship, h and thus there is a unique degree of kinship that minimises manager's value.

(b) For all h sufficiently close to 0, increases in the degree of kinship lower the manager's value.

(c) The manager's value is maximised either at the lowest or highest admissible degree of kinship.

(d) If the manager's value is maximised at the highest degree of kinship, the limited liability constraint must be binding.

(e) If $\bar{p} > \frac{1}{3-\gamma}$, where $\gamma = c/(\bar{p}\bar{x})$ and $\bar{p}\bar{x} - v_R - c$ and $(1-h)\,\bar{p}\bar{x} > c$ are sufficiently close to 0, then increases the degree of kinship, increase the manager's value.

Proof. See the Appendix. □

Examples of parameters which do and do not satisfy (e) are presented in Panels A and B of Figure 7 respectively.

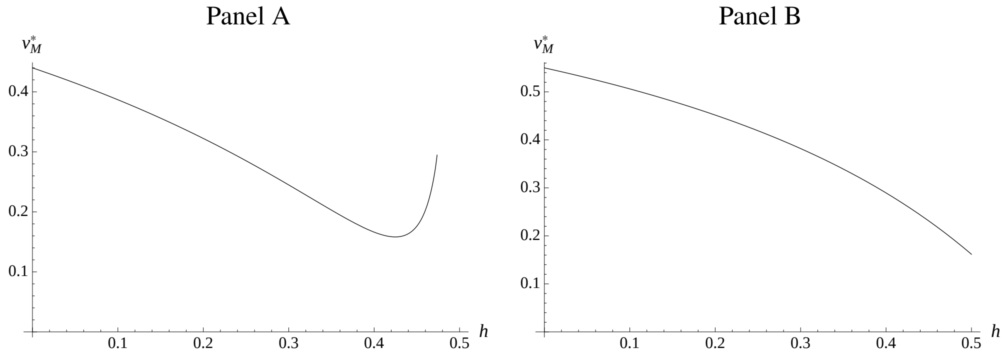


Figure 7: Effect of kinship on the manager's value. In each of the figures, the degree of kinship is plotted on the horizontal axis and the manager's value is plotted on the vertical axis. In both cases, part (e) of Proposition 6 is verified to hold, i.e., at low levels of kinship, the manager's value falls with increased kinship. In Panel A, the conditions of (d) in Proposition 6 are satisfied and, at high levels of kinship, further increases in kinship increase the manager's value while in Panel B, conditions of (d) in Proposition 6 are not satisfied and the manager's value is monotonically decreasing in the degree of kinship

So we see from Proposition 6 and Figure 7 cases exist where, absent kinship between the owner and the manager, monitoring would be strict and compensation large, reflecting the manager's reservation value, and thus the manager's value would be high. With a very high degree of kinship, the incentive to monitor would be weak but at the same time compensation would be low because of the loyalty holdup. Because of low compensation and thus a strong propensity of the manager to divert, monitoring activity would be high despite the owner's low propensity to monitor. Because of all of the monitoring and diversion, the family's value gain from undertaking the project would be small and the manager would thus receive her utility mostly from simple diversion rather than internalised family gains. In this case also, the manager's value would be high.

7 Shades of grey: Combining dark-side and bright side effects of kinship

In this section, we consider the family firm when both monitoring and effort effects are present. The analysis in these cases is much less straightforward. We will assume that monitoring costs, c, are positive, the reservation constraint is not binding, i.e., $v_R = 0$, and that output/effort relation is as specified in equation (9) in the bright-side scenario. We can solve the model in an analogous fashion to the development in sections 4 and 6. Monitoring and reporting probabilities will be the same as those derived in Section 5.3, i.e.,

$$\sigma^* = \frac{c\,(1-p)}{p\,(\bar{x}\,(1-h)-c)}, \tag{46}$$

$$m^* = \frac{(1-h)(\bar{x}-w)}{c\,h+(1-h)\,\bar{x}}. \tag{47}$$

In order to induce the manager to expend sufficient effort to produce success probability, p it must be the case that, given compensation w, p is an optimal choice for the manager. From equation (36) we see that this condition can be expressed as

$$p \in \text{Argmax}\{p \in [0, \bar{p}] : p\,(w + h\,(\bar{x} - w)) - (1-p)h\, m^*(w)\, c^1\!/\!_2\, p^2\}. \tag{48}$$

The owner will always prefer to induce effort at the smallest level of compensation consistent the incentive compatibility condition give by (48) and the limited liability constraint. Define this level of compensation as $w_M^*(p)$. Following the same approach as was followed in Section 4, we can solve for $w_M^*(p)$ which yields

$$w_M^*(p) = \frac{k\,p}{(1-h)^2} - \frac{h}{\bar{x}}\left(\frac{(kp\,(\bar{x}-c) + \bar{x}\,(c + (1-h)\,\bar{x}))}{(1-h)^2}\right). \tag{49}$$

The owner maximises utility over feasible choices of $p \in [0, \bar{p}]$, were as in (38), the owner's utility is given by

$$\bar{p}\,((1 - \sigma^*(p))(\bar{x} - (1-h)\,w_M^*(p)) + \sigma^*(p)\,h\bar{x}). \tag{50}$$

Using the approach developed in Section 4, this yields an optimal choice of p, denoted by p_O^* and given by

$$p_0^* = \min[\max[p_O^{\text{Int.}}, p_O^{\text{Zero}}], \bar{p}], \tag{51}$$

where $p_O^{\text{Int.}}$ is the value of p that solves the first-order condition for the manager's optimisation problem given compensation of $w_M^*(p)$ and p_O^{Zero} is the p the manager will select when compensation is set to the limited liability boundary 0. A bit of algebra yields explicit forms for $p_O^{\text{Int.}}$ and p_O^{Zero}. These are provided below:

$$p_O^{\text{Int.}} = \frac{c^2\,hk + c\,(1-h)\,k\,\bar{x} + (1-h)^2\,(1+h)\,\bar{x}^3}{(1-h)\,kx(((1-h)(2+h))\bar{x} + ch)}, \tag{52}$$

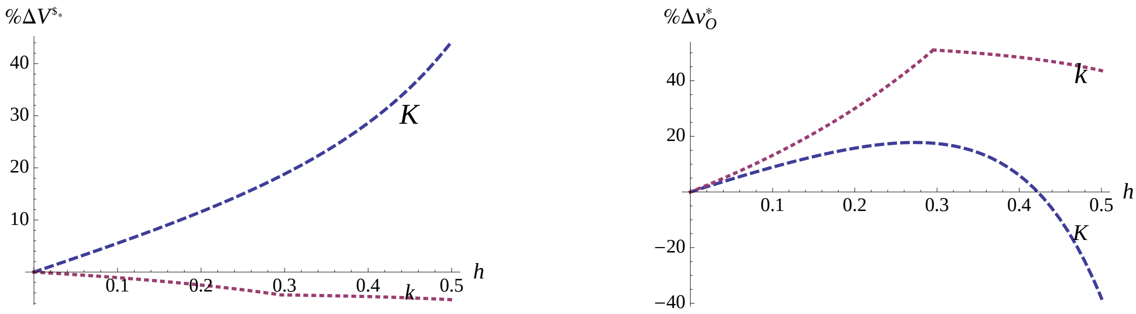
$$p_O^{\text{Zero}} = h\left(\frac{\bar{x}}{k}\right)\left(1 + \frac{(1-h)\,c}{c\,h + (1-h)\,\bar{x}}\right). \tag{53}$$

Substituting p_0^* from (51) in to the equilibrium, wage, w_M^*, monitoring, m^*, and underreporting, σ^*, given by (49), (47), and (46), respectively can be used to determine the effects of kinship in the grey scenario developed in this section.

Unfortunately, as can be seen by inspecting the equations just developed, the grey scenario is somewhat opaque. This is not surprising as there are a number of effects in play. Now the owner significantly more complex tradeoff than the one he faced in either the bright-side or dark-side scenario. An increase in the degree of kinship will (i) increase the owner's own willingness to raise compensation, at the cost of owner's own payoff, if it will increase total family payoff, (ii) make the manager willing to exert the more effort at any given level of compensation, and (iii) make the owner less willing to monitor low reported cash flows Effect (ii) will tend to increase compensation when increased compensation increases firm output at the cost of increasing the rents captured by the manager. However, increase compensation will itself lower the owner's incentive to monitor. The incentive to monitor will also be directly lowered by closer kinship. Because of effect (iii), the manager's gains from diversion will be higher. Since diversion gains can only be reaped if cash flows to divert are produced, these diversion gains will themselves improve the manager's effort incentives. So, even at a fixed or reduced compensation level the manager's value might increase as the degree of kinship is increased. Such an outcome becomes more likely when monitoring costs are high. Thus, when output is highly responsive to effort, as in the bright-side case, and monitoring costs are significant, as in the dark-side case, an increase in the degree kinship may associated with greater manager payoffs but lower compensation, with closely related managers extracting a significant portion of their value from diversion. In contrast, if managerial value-creation is not very pay sensitive at the equilibrium level of compensation, then the increase in the manager's willingness to exert effort for the good of the family caused by an increase in the degree of kinship, will lead the owner to simply reduce compensation. This reduction in compensation will itself increase managerial diversion incentives. In addition, the increased level of family altruism, by discouraging monitoring, will also increase diversion incentives. Thus, compensation will fall steeply in kinship, while diversion and monitoring will rise. Essentially the same result as observed in the dark-side scenario. Which scenario will emerge depends on the specifics of the parameter choices in a highly nonlinear fashion. Thus, we will address this issue numerically rather than through algebraic analysis.

Having fixed on a numerical approach, the next question is which effects of kinship should be the focus of analysis. Since we have assumed that the degree of kinship between the owner and manager is exogenous, and that the human capital required to run the firm is firm specific, neither family agent makes any choice related to the degree of kinship. Thus, in this section, the effect of changes in h on utility have no consequences that can be inferred from agent choices. Also, the non-pecuniary cost of effort is not observable. Thus, we will not consider kinship's effect on agent utility. Rather, we will focus on the observable effects of kinship on monitoring, the owner's (i.e., firm) value, and the manager's monetary value. The manager's monetary value is the manager's value gross of non-pecuniary effort costs. Notationally, we represent the manager's monetary value by superscripting "\$" to v_M. The family's monetary value is the sum of the owner's value and the manager's monetary value, also represented by superscripting family value V with \$.

These effects are illustrated in Figures 8, 9, and 10. In these figures, the variable of interest is plotted against the degree of kinship, h for two cases, high effort costs, represented by K in the graph, and low effort costs, represented by k. Because the absolute payoffs in the two cases are very different, and thus difficult to present on the same graph, we graph the percentage difference of the variable's value from its $h = 0$ value. In Panel A. of Figure 8, we see that increasing the degree of kinship lowers total family value when effort costs are low and increases total family value when effort costs are high. Firm value, plotted in Panel B, has an interior maximum in kinship in the low effort case and is increasing in the degree of kinship in the high effort-cost case.

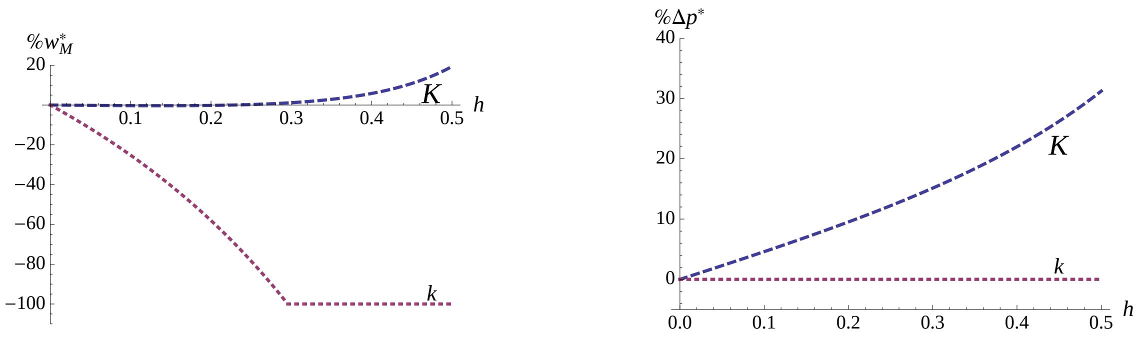


A. Family monetary value

B. Firm value

Figure 8: The % effect of kinship, h, on total family monetary value, $V^{\$*}$, and firm value, v_O^*, for high, K, and low, k, levels of effort cost.

The drivers of these results are plotted in Figure 9. Panel A of this figure shows that compensation is decreasing in the degree of kinship in the high effort-cost case and low effort-cost case but that the rate of decrease is much faster when effort costs are low. When effort costs are low, the owner will opt for a high level of effort regardless of the strength of kinship. As the degree of kinship increases, high level of effort will be attainable at lower levels of compensation. Leading compensation to fall dramatically. In contrast, when effort costs are high, the owner faces a tradeoff with respect to compensating effort between using the higher degree of kinship to motivate more effort or to lower compensation at the same level of effort. The ability of the owner to raise effort checks the fall in compensation, leading to a much smaller effect of kinship on compensation in the high effort-cost case. The limited reduction in compensation coupled with the positive incentive effects of kinship for effort leads the large increase in the probability of the high cash flow, $\bar{x}$ illustrated in Panel B. of Figure 9.



A. Managerial Compensation

B. Probability of high cash flow, $\bar{x}$

Figure 9: The % effect of kinship, h, on managerial compensation, w_M^*, and the probability of success, p^*, for high, K, and low, k, levels of effort cost.

Through its effect on compensation and owner monitoring incentives, kinship also affects monitoring and the manager's monetary value. Compensation is negatively associated with underreporting because the larger the fraction of output the manager can legitimately claim through compensation, the smaller the owner's claim and thus the smaller the gain from diverting the owner's claim. Kinship also is negatively associated with monitoring.

In the case of high effort costs, the small decrease in compensation triggered by increasing the degree of kinship leads to only a small increase in underreporting. Thus, expected monitoring and thus monitoring costs are much less sensitive to kinship in the high effort-cost case. In contrast, when effort costs are low, and thus compensation is falling rapidly in kinship, the increase in the incentive to underreport is dramatic. This incentive is produced both directly from laxer monitoring and indirectly through the sharp drop in compensation. Thus, as illustrated in Panel A of Figure 10, expected monitoring increases rapidly in kinship in the low effort-cost case but only slowly in the high effort-cost case. The manager's monetary value, plotted in Panel B of Figure 10, is composed both of gains from compensation and gains from diversion. In the low effort-cost case, the manager's monetary value falls until the limited liability constraint is reached. At which point compensation is fixed and the reduced monitoring associated with further increases in the degree of kinship caused monetary value to increase. In the high effort-cost case, the small reduction in compensation caused by increasing the degree of kinship is more than compensated by the increased gains from diversion caused by more relaxed monitoring and the manager's monetary value increases with the degree of kinship.

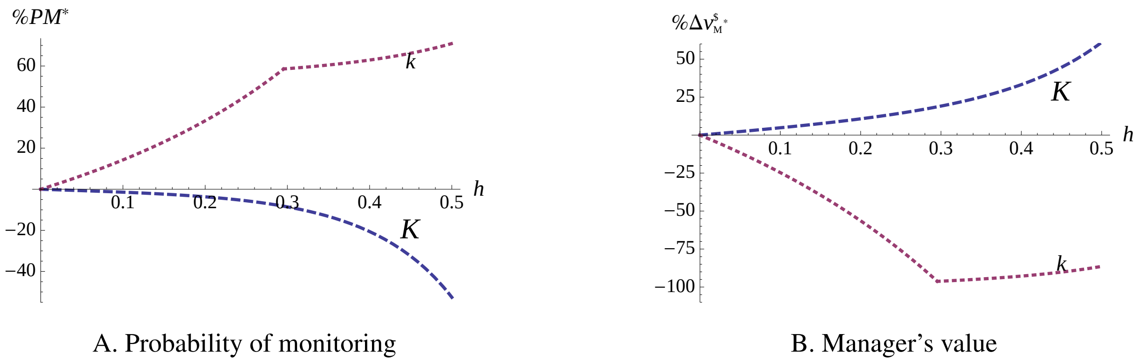


Figure 10: The % effect of kinship, h, the probability of monitoring, PM*, and on the manager's monetary value, $v_M^{\$\,*}$, for high, K, and low, k, levels of effort cost.

8 Extensions: The family firm and the outside world

In the previous sections we noted that kinship may either increase or lower firm value. Under the assumptions that managerial capital is firm specific, the fact that kinship lowers firm value relative to external management has no positive implications—the only manager able to manage the firm is the family manager the only potential owner is the family owner. Under this assumption, either the family operates the firm or no one does. In this section, the family meets the outside world—external labour and capital markets.

8.1 Managerial labour markets: The reserve army of MBAs

For the sake of brevity and ease of exposition, we develop the model of managerial labour markets in as simple a fashion as possible. As will be apparent from the subsequent analysis, our main results do not depend on the specifics of the labour market specification or even on the specific costs of effort. Rather, they follow from the logic of kinship and the limited ability of family loyalty to induce family managers to accept lower compensation from family owners when family managers know that owners can hire competent substitutes on the external labour market.

We assume that there is one family firm in the economy and a continuum of potential external managers. These managers are identical. The family owner initially makes a first-and-final compensation offer to the family manager. If this offer is rejected, the family owner has the option of hiring an external manager. In which case, the family manager enters the external labour pool and receives her reservation payoff v_R. Thus there are two possible allocations of labour from the perspective of the family firm, the family allocation, F, under which the family manager works for the family owner and the non-family allocation, NF, under which the family manager is employed externally and the firm is managed by an external manager. Let (v_O^F, v_M^F) represent the vector of values to the family owner and family manager under the family allocation and let (v_O^{NF}, v_M^{NF}) represent the corresponding vector under the non-family allocation. These values depend on the first-and-final offer made by the family owner and the equilibrium compensation level in the external labour market, which, by the competitiveness assumption, is not affected by whether the family manager works for the family firm or works in the external labour market. For each allocation, let

$$V^a = v_O^a + v_M^a, \quad a \in \{F, NF\}. \tag{54}$$

represent the manager's value and family owner's value under labour allocation a. We see that, using the expression for family agents' utility given in (54), that we can rewrite the family manager's and owner's utility as

$$u_M^a = (1-h)v_M^a + hV^a, \tag{55}$$

$$u_O^a = V^a - (1-h)v_M^a. \tag{56}$$

In order for the manager to accept the owner's first-and-final offer, it must be the case that the manager foresees at least as high utility from working for the family firm as from working in the external labour market. This condition can be expressed as,

$$u_M^F = hV^F + (1-h)\, v_M^F \geq hV^{NF} + (1-h)v_M^{NF} = u_M^{NF}. \tag{57}$$

In order for the owner to make an offer to the family manager which the manager will accept, the owner must foresee at least as high a utility from hiring the family manager as from hiring on the external labour market, which by (54) can be expressed as

$$u_O^F = V_O^F - (1-h)\,v_M^F \geq Pi_O^{NF} - (1-h)\,v_M^{NF} = u_O^{NF}\,. \tag{58}$$

Adding (57) to (58) shows that a necessary condition for an family allocation is that

$$V_O^F \geq V_O^{NF}\,. \tag{59}$$

Thus, given a competitive labour market, the total family value being higher when the firm operates under family management is a necessary condition for family management. Is this condition sufficient? First, consider the case where the family manager's reservation constraint is binding. In this case, $u_M^F = u_M^{NF}$. Thus, it is easy to see, from equation (4), that whenever the total family value is higher under family management, the utility to the owner is highest if the owner hires the family manager. Hence, when the manager's reservation constraint is binding, family hiring will occur if and only if the family management maximises overall family welfare. When the reservation constraint is not binding and thus the family manager's value is higher in the family allocation, the arguments given thus far fail to establish the sufficiency of family value maximisation for the use of family management. In fact, in this case, family value maximisation is not a sufficient condition for family management. This is illustrated in Figure 11.

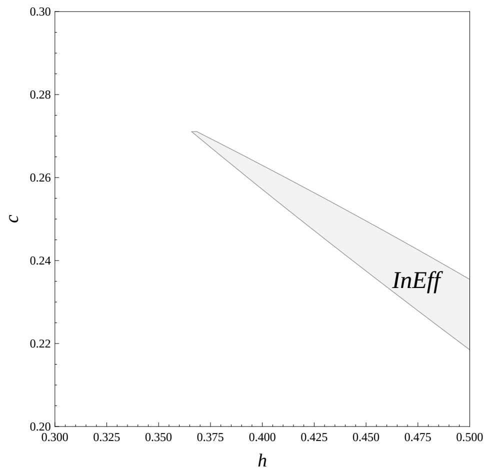


Figure 11: A case where the family owner prefers an external manager even when family management maximises total family value. The parameters for the example are drawn from the dark-side scenario: $x = 1.00$, $v_R = 0.05$, $w_{NF} = 0.11$, $\bar{p} = 0.50$, and $K(p) = 0$.

In the region InEff in Figure 11, family altruism is so high that even though the manager's compensation is driven to the limited liability constraint, monitoring is so lax that the family manager's value exceeds her reservation payoff so much more that the owner's utility is higher under an external manager, whom the owner will monitor much more closely, even though the total family value is higher under family management. Thus, professional management can displace family management even when family management is more efficient. Based on these observations and the example in Figure 11, we have the following result.

Proposition 7. *Assuming a competitive external labour market for managerial talent, managers will be employed by family owners only if the total family value is higher when the family owner and family manager are paired than it is under arms-length, external management. When the family manager's reservation constraint is binding and total family value is maximised by matching managers and family owners, then the family manager and firm will always be paired. There exist parameters for the model under which the family manager works for an external firm even though pairing the family manager with the family firm would maximise total family value.*

As we have seen in our analysis of the dark-side scenario, management of the firm by an otherwise identical external manager can produce a total family value greater than management by a family manager. Thus, if management skills are general, i.e., all managers have the same effort cost and productivity of effort at all firms, and managerial labour markets are competitive, managers will never work for family firms when working for the family firm lowers total family value. In a world of general human capital, loyalty holdups by family managers are not credible. This eliminates the incentive of family owners to hire family members when such hiring reduces efficiency. Thus, the emergence of professional management will lead to the dissolution of inefficient family firms, leaving only family firms where family ownership increases total family value. Thus, we predict that economies with professionalised managerial labour markets will feature more productive family firms.

8.2 Family firms and active external capital: Enter the kings (of capitalism)

In the bright-side parameterisation, family ownership leads managers to internalise the firm's gains from managerial effort. These gains will only be internalised to the extent that the family retains ownership in the firm. Thus, in the bright-side formulation, in which monitoring is costless, introducing ownership by agents who are not related to the family will lower the efficiency of the family firm. Hence, when the family is not capital constrained, outside ownership will never be optimal. When monitoring is costly however, as we have seen earlier, kinship can increase expected monitoring costs. Thus, delegating monitoring to an external (to the family) agent may increase value. However, delegation requires that outsiders be given sufficient ownership stakes to monitor and this increase in external ownership has two effects on managerial incentives. (i) Outside ownership attenuates the family manager's incentive to provide effort and (ii) it reduces the potency of the loyalty holdup because part of the loss caused by the failure to operate is absorbed by extra family parties. (i) causes an efficiency loss but (ii) simply transfers value to the owner. In the dark-side model, the first effect is turned off, and this is therefore the scenario under which external financier control is most likely to raise efficiency. For this reason, for the sake of brevity, we will restrict attention to the dark side case in this analysis of the effect of markets for active external capital on the family firm.

We assume that the family owner has the option to sell the residual stake in the family firm to an external financier in a competitive capital market. The external financier has no kinship relation with either the family manager or owner and thus acts to maximise his expected payoff. Because capital markets are competitive, the cash from sale will equal the expected cash flow to the financier, which includes both the cash flows generated by the project and the costs of monitoring the manager. Hence, the value received by the family will equal the expected total firm cash flows, including monitoring costs. By varying the level of family ownership, the family owner will affect both the family manager's reservation compensation demands and the willingness of the external financier to monitor the manager. These tradeoffs will determine the optimal level of ownership retained by the family. Our focus will be on the conditions under which external finance is optimal. To address this question, we need to solve for equilibrium behaviour in the monitoring and effort subgames to determine, for each fixed level of external ownership, the equilibrium level of monitoring, diversion, and compensation. These levels will determine the value of the firm and the manager under external finance. Thus, we will follow the same steps in solving the model as we followed in Section 5.3. However, because the logic is virtually identical to the logic in that section, our presentation will be very abbreviated.

Under external finance, the stake in the firm held by the family owner is non-residual. This stake consists of a senior debt claim, with a face value of f. Monitoring is performed by an external financier who buys the residual or equity stake in the firm. As in the case of family monitoring, monitoring is costly to the external financier. We represent the external financiers monitoring cost by c_E. Except, perhaps for a difference in the level of monitoring cost, payoffs, and actions in the reporting game with external finance are the same as with family finance. The main difference between the two games is that the manager will not internalise any of the costs of monitoring nor will the external financier internalise any of the manager's gains from diversion.

In order to ensure that the financier's claim is the residual, we restrict attention to compensation levels, w satisfying

$$x - w - f \geq 0. \tag{60}$$

As we will see in the subsequent analysis, this restriction is imposed simply to avoid taxing the reader's patience—the large but non-controlling family stakes required to violate the inequality in (60), are never optimal.

8.2.1 Equilibrium in the reporting subgame

As in the base case of family control, the reporting subgame will involve both the manager and financier following mixed strategies. In order for the financier to randomise, it must be the case that when a report of 0 is received, his payoff from monitoring, which equals $-c_E$ if the cash flow actually equals 0 and $x - f - c_E$ if the cash flow equals $\bar{x}$, must equal his payoff from not monitoring the 0 report, which produces a payoff of 0. Thus, the probability of the cash flow equaling $\bar{x}$ conditioned on a report of 0 must equal $c_E/(x - f)$. By Bayes rule, this implies that the probability that the manager reports 0 when the cash flow equals 1 is, which we represent by σ_E satisfies

$$\frac{c_E}{x-f} = \frac{\sigma_E p}{\sigma_E p + (1-p)}. \tag{61}$$

Thus,

$$\sigma_E^* = \frac{c_E(1-p)}{p(x-f-c_E)}. \tag{62}$$

Now consider the probability of monitoring a report of 0 by the external financier, m^*. This will be set to make the manager indifferent, when the cash flow is $\bar{x}$, between underreporting and not underreporting. If the manager does not underreport when $x = \bar{x}$, the manager's utility is $w + hf$, reflecting compensation of w and inclusive fitness benefit of hf. If the manager diverts, the manager's utility will equal hf if monitoring occurs and x if no monitoring occurs. Thus, the equilibrium monitoring probability, which equates the manager's utility from underreporting and not underreporting is

$$m_E^* = \frac{x-w-hf}{x-fh}. \tag{63}$$

8.2.2 Compensation under external control

Compensation is set to meet the manager's reservation compensation requirement, v_R. Since the manager's utility is equal 0 if the cash flow, x, equals 0 as, in this case neither the family owner nor manager receive any payoff, and is equal to $w + hf$ when $x = \bar{x}$, the manager's equilibrium compensation set will set the minimum level of compensation that satisfies both the limited liability and reservation constraint. Thus, the equilibrium level of compensation is given by

$$w_E^*(f) = \max[\frac{v_R}{p} - fh, 0]. \tag{64}$$

From equation (64) we see that whenever $f \leq \bar{f} = \frac{v_R}{hp}$, the manager's reservation constraint will be binding.

8.2.3 Characterising external finance

In this section, we determine the optimal structure of external finance, i.e., the optimal level of f. First note that the proceeds from the family owner's sale of an ownership stake to the external financier will exactly equal the value of the stake sold given our assumptions of risk neutrality and a competitive capital market. Thus, the family owner's problem is

$$\begin{gathered} \max_f v_{I:E}(f) + h\, v_{M:E}(f), \\ u_{M:0}(f) \geq v_R. \end{gathered} \tag{65}$$

where $v_{O:E}$ represents owner's value under external financier control and $v_{M:E}$ represents the manager's value under external financier control.

Proposition 8. *Whenever the family owner sells a controlling stake to the external financier, the family owner will sell the entire firm to the external financier. Passive family ownership is never optimal.*

Proof. See the Appendix. □

The logic behind this result is simply that the marginal gain from selling the firms cash flows to the active external financier is increasing in the fraction of the firm sold. Selling a small stake to the external financier does not provide the external financier with an incentive to aggressively monitor the manager. At the same time the small stake reduces the force of the loyalty holdup, producing the worst of all possible worlds for owner value. The lower owner value is reflected in the price the family owner receives from the sale of the stake.

8.2.4 Dominance of outside finance for dark-side family firms

Clearly the choice between family ownership and external ownership will depend on the relative monitoring costs faced by the family owner and the external financier. When the family owner's cost of monitoring is lower, family control is more likely to be optimal. The interesting question is whether family control or external control is optimal when the cost of monitoring is the same for family and external owners. The following result shows that in this case sale of the firm *in toto* to an external financier is always optimal.

Proposition 9. *When the monitoring costs of the family owner and external financier are the same, it is always optimal for the family firm owner to sell the firm* in toto *to an external financier.*

Proof. See the Appendix. □

9 Directions for future research

This paper is a first attempt to integrate intra-family altruism into the corporate finance paradigm. Since corporate finance theory is a very rich and well developed field of intellectual inquiry, the scope of a single research paper cannot hope to extract all, or even all of the important implications, of kin altruism. In fact, even listing all of the interesting directions in which this analysis might be extended is not an easy task. However, I will try to map out a few paths for future exploration.

The extension that is closest to the current model development but probably not the most interesting is relaxing the assumption that owners have all the bargaining power in compensation negotiations. To understand the effect of reallocating bargaining power, first consider the effect of a complete reversal of the baseline model assumptions, i.e., grant all bargaining power to the manager. In this case, because the skills required to run the firm are manager specific, the owner's reservation payoff is 0. Thus, if all bargaining power were to be assigned to the manager, the manager would be able to capture the entire payoff from the project. The family manager would in essence become the family owner/manager and family ownership would be resolved into a sole proprietorship. Thus, just as in the standard principal–agent model with unrelated agents, reversing the bargaining power would eliminate the agency problem. A non-trivial division of bargaining power that modelled bargaining using a standard efficient bargaining models (e.g., Nash bargaining solution) between the owner and manager would lead to a solution intermediate between the solution in the baseline model and the first-best solution, with the solution approximating the baseline model solution when the manager's bargaining power was small and approximating first best when the manager's bargaining position was large. Since this is same result that standard non-kinship principal agent models yield, from the perspective of theory, it is not a very exciting extension. However, such an extension, would produce an perhaps important, but not very surprising empirical implication, that as managerial bargaining power increases, the behaviour and performance of family and non-family firms becomes more similar.

Another plausible and closely related direction for future study is to elaborate the model of verification and monitoring. This paper's approach is to model diversion in the most generic and simple framework possible—the manager makes a diversion decision and then the owner makes response which might extract cash flows from the enterprise through liquidation or monitoring (e.g. Townsend (1979) or Harris and Raviv (1995)) or punish the manager, (e.g., withholding capital as in Bolton and Scharfstein (1990)). This simple approach has also been employed in the long-term dynamic contracting literature, e.g., Clementi and Hopenhayn (2006). A more complex specification of the diversion problem however has been used in DeMarzo and Fishman (2007). In this specification, diversion dissipates a fraction of the diverted cash flow even if no action is taken by the principal. If the dissipation fraction is very high, so high that the cash flow remaining after dissipation is less than the agent's equilibrium compensation, then in both with standard non-kinship preferences and kinship preferences, monitoring costs can be eliminated by offering the agent compensation that at least equals the agent's gain from diversion. In contrast, when the fraction dissipated is small, and thus the gain from non monitored diversion far exceeds equilibrium compensation, monitoring is still required. In this case, since the dissipation occurs regardless of monitoring (the costs having already been incurred when monitoring is attempted), monitoring incentives of the family manager are the same as in the baseline model except that the total corpus of value that can be captured by monitoring is lowered by dissipation. The solution in this case would be quite similar to the solution developed in this paper. However, in the intermediate cases where the kin manager would opt for a sufficiently high level of compensation/effort so that dissipation costs alone deter diversion while the non-kin related manager opts for a lower level of effort/compensation, one that required monitoring to block diversion, could lead to lower monitoring costs for the family firm.

A more interesting direction for extension, but one that would lead us further afield, is introducing endogenous governance technology. As the earlier analysis demonstrated, governance quality and kinship are complements.

Thus, family firms have a stronger incentive than non-family firms to invest resources in ex ante governance mechanisms which permit owners to precommit to monitoring family managers. Hence, we expect that if the baseline analysis was extended to permit owners to make costly investment in ex ante monitoring institutions, such investments would be positively correlated with the degree of kinship between the ownership and management groups. Although there appears to be little formal empirical research on the question of how family ownership affects corporate governance investment, fairly strong anecdotal evidence makes this prediction plausible. A number of organisations, such as the Family Office Exchange, have developed. These firms specialise in developing family charters and other governance devices specifically for family firms (see Daniell and Hamilton (2010)). Such charters can be interpreted in the context of this paper's model as mechanisms to solve the problem of ex ante commitment to effective control in order to compensate for lax ex post enforcement in family firms.

Modelling capital constraints in this framework is also quite feasible. In this paper, the family firm's investment in the project is sunk and the project is fully owned by the family. Thus, the family is not capital constrained. External capital plays a role in the analysis but only in the form of active capital used to facilitate control transfer. If the family firm were capital constrained, it would have to resort to external capital. If this capital was passive and thus the family owner retained the controlling interest, then the external capital would both reduce the manager's effort incentives and the owner's monitoring incentives. Hence, passive outside ownership would lower firm value For this reason, the cost of capital for family firms would be higher than for non-family firms leading to underinvestment in the presence of capital constraints.

Finally, another direction for extension—modelling the dynamics of family control—would no doubt also yield significant new insights but would require fundamental extension of the analytical framework. In the current framework, the families investment in project acquisition is sunk and owner's and manager's lifespans match the singe period lifespan of the firm. In a dynamic setting, the family would need to acquire capital to finance projects which would create cash flows that extend perhaps beyond the lifespan of current family members. Capital acquisition would require raising passive external capital and issues of succession would create inter family conflicts over the choice of successor. Such an analysis would produce predictions for the effect of family ownership on firm scale and distortions in operating policies caused by inheritance incentives.

Appendix

Proof of Proposition 1. The proof is straightforward and follows from explicit computation. By inspection, we see that $p \to w^*_M$ is increasing and thus order preserving. Substitution of expression (20) into the function w^*_M, defined by equation (15), thus yields

$$w^*_O = w^*_M(p^*_O) = w^*_M\left(\max\left[0, \min\left[\frac{(h+1)x}{(h+2)k}, \bar{p}\right]\right]\right) =$$
$$\max\left[w^*_M(0), \min\left[w^*_M\left(\frac{(h+1)x}{(h+2)k}\right), w^*_M(\bar{p})\right] =\right] \max\left[\min\left[x\frac{1-h^2-h}{2-h^2-h}, \frac{k\bar{p}-hx}{1-h}\right], 0\right]. \quad (66)$$

Now consider firm value which equals $p^*_O(\bar{x} - w^*_O)$. Because w^*_O is weakly decreasing in h and strictly decreasing at $p^*_O \in (p_0, \bar{p})$ and $(p^*_O$ is weakly increasing and strictly increasing at $p^*_O \in (p_0, \bar{p})$ we see that the assertion regarding firm value is true. Next, consider the manager's value, given by

$$p^*_O\, w^*_M(p^*_O) - 1/2\, k\, {p^*_O}^2. \quad (67)$$

Consider the function Γ defined by

$$\Gamma : p \to p\, w^*_M(p) - 1/2\, k\, p^2. \quad (68)$$

From (67) we see that the manager's value is given by $\Gamma[p^*_O]$. Moreover Γ is increasing for $p \geq p_0$ and thus order preserving. Hence, the manager's value is given by

$$\Gamma[p^*_O] = \Gamma\left(\max\left[p_0, \min\left[\frac{(h+1)\,\bar{x}}{(h+2)\,k}, \bar{p}\right]\right]\right) = \max\left[\Gamma(p_0), \min\left[\Gamma\left(\frac{(h+1)\,\bar{x}}{(h+2)\,k}\right), \Gamma(\bar{p})\right]\right]. \quad (69)$$

Applying the definition of Γ and p^*_0 given by equations (68) and (20) respectively yields

$$\max\left[-\frac{h^2\bar{x}^2}{2k}, \min\left[\frac{(1+h)\left(1-2h-h^2\right)\bar{x}^2}{2(2+h)^2k(1-h)}, \frac{\bar{p}((1+h)kp-2h\bar{x})}{2(1-h)}\right]\right]. \quad (70)$$

The component functions of (70) are all weakly decreasing in h and all components except the 0 term are strictly decreasing. Thus, the manager's value is weakly decreasing in h and strictly decreasing whenever compensation is positive. □

Proof of Proposition 3. Managerial compensation, when the limited liability constraint is not binding, i.e., $w^*_M >$ 0, is given by (40). The expression in (40) is a rational function without an zero in the denominator within the acceptable range of parameters. Thus, the function is smooth. Rather straightforward, but very tedious, differentiation and simplification of this function shows that when $w_M^* > 0$

$$w_M^{*\prime}(h) = -\frac{(\bar{p}\bar{x} - v_R)\left(\left((1-h)^2(\bar{x}-c) + 2c(1-h)\right)(\bar{p}\bar{x}-c) + c^2\right)}{(1-h)^2(ch + (1-h)\bar{p}\bar{x})^2}. \tag{71}$$

Because $w_M^{*\prime}$ is negative and decreasing the result follows for the case of $w_M^* > 0$. Since w_M^* is a continuous non-negative function of h and is decreasing whenever $w_M^* > 0$, w_M^* is weakly decreasing for all $h \in [0, 1/2]$. □

Proof of Proposition 4. To prove (a), let M_+ represent the equilibrium probability of monitoring conditioned on the equilibrium level of compensation when compensation is positive, i.e.

$$M_+ = m^*(w_M^*), \quad w_M^* > 0 \tag{72}$$

Let let M_0 represent the equilibrium probability of monitoring conditioned on the equilibrium level of compensation when compensation is 0, i.e.,

$$M_0 = m^*(w_M^*), \quad w_M^* = 0. \tag{73}$$

The equilibrium monitoring probability is then given by M defined by

$$m^*(w_M^*) = \begin{cases} M_+ & \text{if } w_M^* > 0, \\ M_0 & \text{if } w_M^* = 0. \end{cases} \tag{74}$$

To find the explicit form of M_+, substitute the equilibrium compensation when compensation is positive, defined in expression (41), into the probability of monitoring a report of 0 given the equilibrium compensation, defined by (30). This yields

$$M_+(h) = \frac{\bar{p}\,\bar{x} - v_R}{c\,h + (1-h)\,\bar{p}\,\bar{x}}. \tag{75}$$

Differentiating this expression with respect to h yields

$$M_+'(h) = \frac{(\bar{p}\,\bar{x} - v_R)(\bar{p}\,\bar{x} - c)}{(c\,h + (1-h)\,\bar{p}\,\bar{x})^2} > 0. \tag{76}$$

This establishes (a). To prove (b), first note that the total probability of monitoring equals the probability that the manager reports 0 times the probability that the family owner monitors a report of 0. Thus the total probability of monitoring is given by

$$m^*(w_M^*)\,(1 - \bar{p}\,(1 - \sigma^*)). \tag{77}$$

where σ^* is defined by (30). As shown in Proposition (2), σ^* is increasing in kinship. As shown by (b), M is increasing when $w_M^* > 0$, thus the result is established for the case of $w_M^* > 0$. Proposition 2 shows that for any fixed compensation level, and thus for $w = 0$, the total probability of monitoring is increasing. Now consider (c). First note that the total family value of the is equal the expected operating cash flow, $\bar{p}\bar{x}$ less expected monitoring costs. Thus, total family value is given by

$$\bar{p}\bar{x} - c\,m^*(w_M^*)\,(1 - \bar{p}\,(1 - \sigma^*)). \tag{78}$$

Thus, the fact that the probability of monitoring is increasing in kinship implies that the expected cost of monitoring is increasing in kinship. Since kinship does not affect expected operating cash flows, $\bar{p}\bar{x}$, and increases monitoring costs, it must decrease family value. □

Proof of proposition 5. Let $\bar{h}$ be defined as

$$\bar{h} = \max\{h \in [0, 1 - c/(\bar{p}x)] : w_M^*(h) \geq 0\}. \tag{79}$$

After considerable algebraic simplification, we can express the value of the family firm as a function of h, restricted to the domain $[0, \bar{h}]$ as follows:

$$v_O^*(h) = (\bar{p}\bar{x} - v_R)\frac{\mathbf{N}(h)}{\mathbf{D}(h)}, \tag{80}$$

$$\mathbf{N}(h) = \left(\left(c^2 + (1-h)\,\bar{x}\,(\bar{p}\bar{x} - c)\right) - \frac{c^2}{1-h}\right), \tag{81}$$

$$\mathbf{D}(h) = ((1-h)\bar{x} - c)(h\,c + (1-h)\,\bar{p}\,\bar{x}). \tag{82}$$

The functions, $h \hookrightarrow \mathbf{N}(h)$ and $h \hookrightarrow \mathbf{D}(h)$ are both positive under the assumptions given in (34) and (35). The term $\bar{p}\bar{x} - v_R$ is a positive and constant in h and thus can be ignored in the subsequent derivation. Because the functions $\mathbf{N}$ and $\mathbf{D}$ are smooth over their domain, and the second derivative of $\mathbf{N}$ is negative while the second derivative of $\mathbf{D}$ is positive, $\mathbf{N}(\cdot)$ is strictly concave and $\mathbf{D}(\cdot)$ is strictly convex. To establish quasiconcavity, suppose that

$$\frac{\mathbf{N}(h)}{\mathbf{D}(h)} > \frac{\mathbf{N}(h')}{\mathbf{D}(h')}. \tag{83}$$

Rearranging (83) produces

$$\mathbf{N}(h) - \mathbf{D}(h)\,\frac{\mathbf{N}(h')}{\mathbf{D}(h')} > 0. \tag{84}$$

The left hand side of (84), viewed as a function of h with h' fixed is strictly concave as it is the difference between a strictly concave function and a strictly convex function multiplied by a fixed constant. Thus for any $\lambda \in (0,1)$

$$\begin{aligned}\mathbf{N}(\lambda h+(1-\lambda)h')-\mathbf{D}(\lambda h+(1-\lambda)h')\frac{\mathbf{N}(h')}{\mathbf{D}(h')} &> \\ \lambda\left(\mathbf{N}(h)-\mathbf{D}(h)\frac{\mathbf{N}(h')}{\mathbf{D}(h')}\right)+(1-\lambda)\left(\mathbf{N}(h')-\mathbf{D}(h')\frac{\mathbf{N}(h')}{\mathbf{D}(h')}\right) &= \lambda\left(\mathbf{N}(h)-\mathbf{D}(h)\frac{\mathbf{N}(h')}{\mathbf{D}(h')}\right)>0. \quad (85)\end{aligned}$$

where the last equality follows from the hypothesis, equation (83). Thus,

$$\frac{\mathbf{N}(\lambda h+(1-\lambda)h')}{\mathbf{D}(\lambda h+(1-\lambda)h')} > \frac{\mathbf{N}(h')}{\mathbf{D}(h')}, \forall\lambda \in (0,1). \quad (86)$$

This establishes strict quasiconcavity over $[0,\bar{h}]$. The value function is strictly decreasing over $h \in [\bar{h},1/2]$, and is continuous at $\bar{h}$. Thus, the value function is strictly quasiconcave over the entire range of h, $[0,\bar{h}]$.

Hence, the value function is quasiconcave in h. The necessary and sufficient condition for the value function to have a maximum over $(0,\bar{h}]$ is for the derivative of the value function is positive at $h=0$. The left-hand side of (43) and (44) , has the same sign as the derivative of v_O evaluated at $h=0$. □

Proof of Proposition 6 . The manager's value is the maximum of the manager's value when the limited liability constraint binds, i.e., $w=0$ and manager's value when the reservation constraint binds. The maximum of strictly quasiconvex functions is strictly quasiconvex. The manager's value is clearly increasing in h on the limited liability constraint. Thus, we only need to show that the manager's value is quasiconvex when compensation is determined by the reservation constraint. To see this, note that, the manager's value when the manager's value is determined by the reservation constraint, which we represent by v_M^p, can be simplified to obtain

$$v_M^p(h) = \bar{p}x-(\bar{p}\bar{x}-v_R)\mathbf{F}(h), \quad (87)$$

$$\mathbf{F}(h) = \frac{\mathbf{N}(h)}{\mathbf{D}(h)}, \quad (88)$$

$$\mathbf{N}(h) = \frac{(1-h)^2\bar{p}\bar{x}(x-c)-c^2h}{(1-h)\bar{x}-c}, \quad (89)$$

$$\mathbf{D}(h) = (1-h)(ch+(1-h)\bar{p}\bar{x}). \quad (90)$$

Next note that $\mathbf{N}$ is strictly concave and positive and $\mathbf{D}$ is strictly convex and positive. Thus using an argument identical to the one used in the proof of Proposition 5 we can verify that $\mathbf{F}$ is quasiconcave. Because $\mathbf{F}$ is quasiconcave and the term multiplying $\mathbf{F}$ in equation (87) is negative and constant in h, we see, from inspecting (87) that v_M^p is quasiconvex.

Next note that when $h=0$ the reservation constraint binds so

$$v_M^p(h)-v_M(0) = v_M^p(h)-v_M^p(0) = v_M^p(h)-(k+v_R). \quad (91)$$

Using the representation of v_M^p given in (87) we obtain,

$$v_M^p(h) - (k + v_R) = (1 - \mathbf{F}(h))\,(\bar{p}\,\bar{x} - v_R). \tag{92}$$

By the parametric restrictions imposed in (7) we see that $\bar{p}\,\bar{x} - v_R > 0$, because $\mathbf{F}$ is less than 1 over the region of admissible parameters,

$$(1 - \mathbf{F}(h))\,(\bar{p}\,\bar{x} - v_R) > 0. \tag{93}$$

Combining (92) and (93) shows that

$$v_M^p(h) < v_M(0), \quad h \neq 0. \tag{94}$$

Because v_M is quasiconvex in h, it attains is maximal value on the extreme points of its domain. These extreme points are $h = 0$ and $h = \min[1/2, 1 - c/(\bar{p}\bar{x})]$. If the reservation constraint binds at $1 - c/(\bar{p}\bar{x})$ we have shown that this point cannot be a maximiser of v_M. Thus, the maximal value of v_M is attained either at $h = 0$ or the at $h = \min[1/2, 1 - c/(\bar{p}\bar{x})]$ and in this case the reservation constraint is not binding. Next, consider the sufficient conditions for an internal minima. When $\bar{p}\,x - v_R - c$ is sufficiently close to 0, the reservation constraint is always binding at all admissible h If we differentiate v_M and evaluate the derivative where $(1 - h)\,\bar{p}\,\bar{x} - c = 0$ we find the derivative is given by

$$(\bar{p}(3 - \gamma) - 1)\,\frac{(\bar{p} - v_R)\,(1 - \gamma)}{(1 - \bar{p})\,(2 - \gamma)^2\,\gamma^2}. \tag{95}$$

This term must be positive for an interior minimum to exist. Since the fraction in (95) is always positive the necessary and sufficient condition for (95) to be positive is that $\bar{p}\,(3 - \gamma) - 1) > 0$ which is a condition given in the proposition. □

Proof of Proposition 8. Note that we can rewrite this problem as

$$\begin{gathered} \max_f V_E(f)\,(1 + h) - u_{M:E}(f), \\ u_{M:E}(f) \geq v_R. \end{gathered} \tag{96}$$

where, $V_E(f)$ is the total family value to the firm and the manager under external financier control. If we restrict the problem to $f \leq \bar{f}$, the reservation constraint will bind and thus, over the region $f \in [0, \bar{f}]$ the optimal solution will maximise V_E. We can express $V_E(f)$ as

$$V_E(f) = p\,\bar{x} - c_E\,\mathrm{PM}_E^*(f). \tag{97}$$

PM_E^* represents the probability of monitoring, i.e.,

$$\mathrm{PM}_E^* = \mathrm{PM}_E^*(f, w_E^*(f)) = (m_E^*(f, w_E^*(f))\,(1 - p\,(1 - \sigma_E^*(f))). \tag{98}$$

Substituting (62), and (62) into (98) under the assumption that $f \in [0, \bar{f}]$ yields an explicit expression for PM_E^*

$$\mathrm{PM}_E^* = \frac{(x-f)\,(p\,x - v_R)\,(1-p)}{p\,(x - c_E - f)(x - f\,h)}. \tag{99}$$

Differentiating this expression with respect to f yields.

$$\frac{\partial \mathrm{EM}_E^*}{\partial f} = \frac{(1-p)\,(p\,x - v_R)\left(c_E\,x(1-h) + h\,(f-x)^2\right)}{p\,(x - f - c_E)^2\,(x - f\,h)^2}. \tag{100}$$

The expected monitoring is increasing f for $f \in [0, \bar{f}]$, this implies by (4) that $V_E(f)$ is decreasing and thus, for $f \in [0, \bar{f}]$, the optimal choice of f is 0. Now consider $f > \bar{f}$. Over this range,

$$u_{M:0}(f) > v_R. \tag{101}$$

Thus, by (96) if we can show that the family owner's utility will be lower than it is at $f = \bar{f}$ provided $V_E(f) \leq V_E(\bar{f})$. This is indeed the case because for $f > \bar{f}$, $w_E^*(f) = 0$, $m_E^*(f) = 1$. Thus,

$$\mathrm{PM}_E^* = \frac{(1-p)(x-f)}{x - c_E - f}. \tag{102}$$

which is increasing in f. Thus the probability of monitoring is increasing in f and value is decreasing. Hence for $f > \bar{f}$, $V_E(f) < V_E(\bar{f})$. □

Proof of Proposition 9 . The result follows from a straightforward calculation based on monitoring probabilities. If the family owner sells out then by Proposition 8, the family owner's utility is given by

$$V_E(f = 0)\,(1 + h) - u_{M:E}(f = 0). \tag{103}$$

If the family retains control the family owner's utility is given by

$$V_F\,(1 + h) - u_{M:F}. \tag{104}$$

where V_F represents total family value (family owner plus manager) under family control and $u_{M:F}$ represent the utility of the manager when the firm is controlled by the family owner. If the reservation constraint is binding under family control then the difference in family owner utility will depend only on the total family payoff. In this case the difference has the opposite sign to the difference in the probability of monitoring which can be computed from (99) and (77). When the costs of monitoring are the same for the external financier and the family owner and the owner is following the optimal ownership strategy of completely selling out to the financier, i.e., $c_E = c$ and $f = 0$, the difference is given by

$$\mathrm{PM}_E^*(f=0) - \mathrm{PM}_F^* = -\frac{h\,(1-p)\,(px-v_R)\,\big(x\,(px-c)(1-h)+c^2\big)}{p\,(x-c)((1-h)x-c)(ch+(1-h)px)} < 0. \tag{105}$$

The the expected monitoring probability is higher under family control and hence total family value is lower. Thus, whenever the reservation constraint binds under family control, family control produces a lower payoff to the family manager than sale to the external financier.

If the reservation constraint is not binding and thus the compensation of the manager is not fixed by the limited liability constraint, $u_{M:F} > v_R$. In this case, the family owner's utility is less than it would have been under the relaxed problem without limited liability. Absent the limited liability constraint, expression (105) would still fix the difference in monitoring probabilities. Since the reservation constraint always binds under external finance, even relaxing the limited liability constraint only for family control would sill leave family control producing a smaller total family value than sale. Thus, family control will always produce a lower utility to the family owner than sale to the external financier. □

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