Family Capitalism Corporate Governance Theory

Jellal, Mohamed

Al Makrîzî Institut d'Economie

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Mohamed Jellal

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Abstract

Family firms, which are prevalent around the world both for small organizations and large corporations, are usually more performant than other types of firms. This paper draws on altruism and on the theory of incentives contracting to explain why family firms perform better. Assuming that altruism only exists in family firms, we show that the strength of family ties has an impact on the optimal contract only under asymmetric information. Then, we extend the analysis to the principal-agent supervisor setting and prove that the recruitment of family members may be seen as a device against collusion within a three-tier hierarchy.

JEL classification: D21, D64, D82, L2

Key words: Altruism, asymmetric information, collusion, family business, supervisor principal-agent

1 Introduction

In the modern field of corporate finance, it is often assumed that widely-held corporations are prevalent, with ownership of capital dispersed between numerous small shareholders (Berle and Means, 1932). As a consequence, the modern corporation would be run by professional managers unaccountable to shareholders. While the image of a widely-held corporation has been used in theoretical developments on the theory of the firm (Jensen and Meckling, 1976), recent studies have cast doubt on this view by showing that there exist some forms of concentration of ownership in numerous countries. The insightful research of La Porta et alii (1999) about corporate ownership around the world indicates that there are few widely-held firms for most of the wealthy economies.

While it is often admitted that large firms are widely-held or controlled by government of financial institutions, La Porta et alii (1999) find instead that large corporations are mainly controlled by families, and family firms are the dominant form of business in numerous developed countries. Family control is more common in countries with good shareholder protection and little separation between ownership and management is observed in family firms. That the principal owner type of large corporations is the family is not in itself surprising. Bhattacharya and Ravikumar (2001) also mention this prevalence of family firms, both for small enterprises and also for large corporations. In developing countries, it is well acknowledged that family firms are the bulk of the private economy.

What is the real place of family business ? According to Gersick et alii (1997), the share of family business within worldwide business would be about 65-80%. For example, family business accounts for 40% of the GDP and 60% of the workforce in the United Sates. Family businesses also employ respectively 75% and 50% of the workforce in Germany and in Britain (for additional evidence on the prevalence of family firms, see Bhattacharya and Ravikumar (2001), Chami (2001), Gomez-Mejia et alii (2001) and the numerous references therein. Lotti and Santarelli (2002) focus on the survival of family firms) . The evolution of the size of family businesses is more controversial. On the one hand, Bhattacharya and Ravikumar (2001) argue that the dominance of family firms diminishes as capital markets develop, as shown for instance by the decline of the large family firms in the United States. On the other hand, Allouche and Amann (1995) note that among the 1000 largest French firms, the number of family enterprises has decreased, but this decline has been accompanied by a greater size for each family firm and an increase in the contribution of family business to the overall business.

Thus, it seems a worthwhile issue to understand why family firms are still so important both in developed and developing countries. To our opinion, an argument based on the performance of family firms can be put forward. We believe that family firms (either owned or controlled) are more performing than other types of firms. From a theoretical perspective, one can argue that family firms should progressively disappear if they were less performing than other types of firm management. Using an evolutionary approach, less successful types of enterprises are ruled out given market competition, so that only efficient types prevail in the long run.

Empirical evidence favors the higher performance of family firms. Morck et alii (1988) show that a family control exerts a positive effect on Tobin's Q. Also, McConaughy et alii (1998) observe that family firms perform better than nonfamily firms, size and industry being held constant. Allouche and Amann (1995) indicate that the mean profitability is higher for family firms than nonfamily firms in France. Studying two subsamples of firms (family versus nonfamily) over the period 1989-1992, the authors find that measures of performance are always better for firms controlled by families. For example, the net profitability and the profit margin are respectively 3.1% and 5.4% for family firms, instead of 2.2% and 3.6% for nonfamily firms. Clearly, these results argue in favor of an increased efficiency for family business.

In spite of the prevalence of family firms over the world and the positive effect on economic performance, economic research about family business remains especially scarce. Recently, two papers have attempted to examine the role played by family firms and to provide theoretical microeconomic foundations for the specificity of family business.

On the one hand, Bhattacharya and Ravikumar (2001) study the role of capital markets on the evolution of family business, by focusing on the timing of selling a family firm. Family business is modeled as a household operating a production technology, and human capital is a fixed factor of production which can be transferred down the generations. On the evolution of family firms, see also Bhattacharya and Ravikumar (2002). Assuming an altruistic bequest motive (see Becker, 1991), the household can sell the business firm at any point in time using primary capital markets, but it does not have any private benefits of control. Hence, in economies with less developed primary capital markets, one expects a greater size and a longer duration for family business. On the other hand, Chami (2001) considers a setting with an altruistic parent and a child working for the family firm. The child's effort level is supposed to be private information, and this gives rise to a serious moral hazard problem. Chami (2001) points out the role of trust between family members as an efficiency enhancing mechanism, since it mitigates the moral hazard problem, and notes that the succession in family firms from the parent to one child leads the child to internalize part of the moral hazard.

The key feature of these studies on family business is the presence of altruism between family members. According to Becker (1991), an altruistic parent cares for the well-being of his selfish child and transfers income flow from the least to the most financially needy generation, independently of any present or future reciprocating help. Our interest in altruism concerns the focus on the specificity of family relationships, further discussed in Laferrère and Wolff (2004). Given frequent and repeated interactions between family members, the strength of family ties is more likely to involve cooperative behaviors. Reputation and opportunities for future punishment are also expected to favor cooperation within the family. As a consequence, altruistic feelings owing to family ties would have a positive effect on the agency problems which may occur in environment characterized by imperfect information between agents.

Some studies have recently examined the positive effect of altruism in the setting of the firm. Mulligan (1997) proposes a principal-agent problem with an endogenously loyal agent. Since a loyal agent exerts higher effort level because he cares about the wellbeing of the principal, the principal has incentive to make their agents loyal. Rotemberg (1994) shows that altruism tends to raise productivity when employees work as a team. The presence of strategic complementarily between actions by agent and principal breeds altruism. The beneficial role of trust is put forward by Fukuyama (1995), who indicates that cooperation is needed for the success of large firms. Clearly, trust enhances efficiency and profitability of firms, with lower monitoring expenditures (Allouche and Amann, 1998, Chami and Fullenkamp, 1999, James, 1999). The effect of trust on performance of large organizations appears significant and quantitatively large (La Porta et alii, 1997).

In this paper , we intent to show that the strength of family ties may explain the superior performance of family firms. Following previous research on family business, we consider that the central distinction between family and non-family firms is the presence of altruism in the former case. Then, we investigate the role of altruism and wonder whether successful family firms may be due to the reducing impact of family relationships on the agency problems that occur in the business environment. We demonstrate that family members may have an advantage in monitoring production activities, so that family firms become more performant (see also the discussion in Fama and Jensen, 1983). Specifically, we use the microeconomic theory of incentives contracting to provide foundations for the greatest performance of family business as the result of rational decisions of utility maximizing agents. We demonstrate that both altruism and informational aspects play a role to explain why family firms perform better .Although there have been some attempts to account both for agency problems and altruism in the theory of the firm (Harvey, 1999, Jensen, 1994, Schulze et alii, 2003, Van der Berghe, 2003), these studies which mainly deal with organizational aspects do not formally demonstrate the prevalence of family business. Also, they do not elaborate on the complex interrelationships between altruism and agency theory.

The novelty of our paper is to disentangle the effects of altruism and information in a formalized framework. For that purpose, we begin by considering a simple production problem with one principal and one agent, which may be a family member or a stranger. With a family member, the principal cares for the agent's welfare in the maximization problem. We prove that the optimal contract is neutral with respect to altruism in a setting of perfect information. However, when relaxing this assumption, we demonstrate that a family firm should perform better since the informational rent is less costly for the principal under altruism. Then, we extend the analysis to the case of a three-layer hierarchical structure using the model developed in Tirole (1986, 1992), but consider the case of continuous types of agents and explicitly account for the cost of side contract. We demonstrate the interest of hiring family members in the deserving combat against collusion within the firm.

The remainder of the paper is organized as follows. In section 2, we describe the production problem with one parent as a principal and an agent who manages the firm, and characterize the optimal contract under symmetric information. This assumption is relaxed in section 3, where we investigate the role of altruism on the informational rent in a family firm. In section 4, we extend the problem to the supervisor-principal-agent paradigm and study the case of a contract with no collusion. We examine the pattern of optimal collusion under perfect information in section 5. The problem of collusion with side payment under imperfect information is described in section 6. Concluding comments are in section 7.

2 Labor Contract under Symmetric Information

2.1 The production problem

We begin our analysis of family firms by considering a simple production problem with two agents, a principal and an agent. The principal is the ownership of a firm which is managed by the agent. The latter may be a family member (an insider), but the principal may also hire an agent who does not belong to the family (an outsider).

The central assumption in our paper is that the difference between family firms and non-family firms is linked to the strength of family ties between the principal and the agent. When the principal hires a non-family member, he has no prior information on this individual and thus he behaves in a perfectly egoistic way. Therefore, he only seeks to maximize the expected profit resulting from production. Conversely, with a family member, we admit that the principal behaves in a benevolent way. Following the altruistic hypothesis made famous by Becker (1974, 1991), this implies that the principal derives some satisfaction from the agent's level of well-being.

It is well known that the introduction of altruism affects the allocation of resources within the family. As described in Laferrère and Wolff (2004), the main prediction of the altruism model for intergenerational redistribution is that when parent and child are linked by positive transfers, redistributing at the margin income from the parent to the child is completely neutralized by a transfer in the opposite direction. This neutrality property is the basis of Ricardian equivalence, so that public transfers are expected to totally crowd out private family transfers under altruism and interior solutions . From an empirical viewpoint, this prediction is not supported by microeconomics data when looking at the provision of transfers to children (Altonji et alii, 1997). Nevertheless, less strong implications of altruism are clearly verified. Usually, the probability and amount of transfers are positively related to parent's income and negatively related to child's income (see Laferrère and Wolff, 2004). Also, when looking at the distribution of transfers among siblings, one observes that financial gifts are more likely to go to the less well-off children (Dunn and Phillips, 1997, McGarry and Schoeni, 1995, 1997).

Interestingly, in the field of intergenerational transfers, some papers have recently attempted to relax the prevalent assumption of perfect information. Chami (1996, 1998) proves that labor market conditions exert an influence upon the type and level of transfers provided by parents to their children. Also, the fact that parents are unable to perfectly observe the amount of child's effort explains why altruistic parents have a preference for late bequests rather than early financial inter vivos gifts (Cremer and Pestieau, 1998). Drawing on a model of coresidence and transfers to children, Jellal and Wolff (2003) show that when parents do not perfectly know the privacy cost of their children in home-sharing, they make additional transfers in order to discipline their children and provide them with incentives to reveal their true privacy cost. The predictions of the altruistic model are affected in a context of imperfect information. When the child's income reacts to the transfer, the neutrality property may eventually break down, depending on the information of parent and child about each other's preferences and endowment. For an overview, see Laferrère and Wolff (2004).

The link between family altruism and agency problems lies at the heart of our analysis. It has been suggested that altruism makes family memberships more valuable in a way that sustain the bond among them (see Eshel et alii, 1998). As a consequence, one can be confident that altruism should have an impact in the domain of family firms. As pointed out by Simon (1993, p. 160), "appropriate attention to altruism, especially organizational identification, substantially changes the theory of the firm". The novelty of our paper is to focus on the interplay between altruism and information structure to explain why family firms perform better. Thus, our contribution is one of the first formal attempt to account for altruism in the growing domain of family firms, Chami (2001) and Bhattacharya and Ravikumar (2001, 2002) between noticeable exceptions.

So, let us consider the following model of adverse selection characterized by a complete centralization of information. Let q be the level of output realized by the agent, which is an indicator of the agent's performance on the market. In terms of satisfaction, the value of q units of production for the principal is given by the function (q). We make the usual assumptions that the function $v(q)$ is continuous, three-times differentiable and concave, i.e. $v'(q) > 0$ and $v''(q) \leq 0$. When participating in the production activity q, the agent supports a cost denoted by $c(\theta, q)$ where θ is an indicator of the type of agent. A more efficient agent is characterized by a lower value for the parameter θ. We assume that $c(\theta, q)$ is common knowledge, but the cost parameter θ is only known privately to the agent. Unless otherwise, the parameter θ can take on any value in the closed interval denoted by Ω, with $\Omega = [\underline{\theta}, \overline{\theta}]$.

The parameter θ of efficiency type is modeled as the realization of a random variable with distribution $F(\theta)$ and corresponding density function $f(\theta)$, both defined over the support Ω. We assume that the parameter θ satisfies the following conditions.

Assumptions

(A1) $\frac{\partial c(\theta,q)}{\partial \theta} > 0$, (A2) $\frac{\partial^2 c(\theta,q)}{\partial \theta \partial q} > 0$, (A3) $\frac{\partial^2 c(\theta,q)}{\partial q^2} > 0$, (A4) $\frac{\partial^2 c(\theta,q)}{\partial \theta \partial q^2} \geq 0$ and $\frac{\partial^2 c(\theta,q)}{\partial \theta^2 \partial q} \geq 0$, (A5) $\frac{d}{d\theta}\left(\frac{F(\theta)}{f(\theta)}\right) \geq 0$.

Assumption 1 is the monotonicity condition, so that $\underline{\theta}$ corresponds to the most efficient type of agent. Assumption 2 is the single crossing property, which is a sufficient condition for the local and global conditions for incentive compatibility. Assumption 3 is a convexity condition, and assumption 4 includes sufficient conditions to solve the principal's optimization problem. Finally, assumption 5 may be seen as a decreasing returns assumption. The monotone hazard rate for F is a standard condition in the incentive contracting theory (Laffont and Tirole, 1993).

The principal's problem is to design a compensation structure that maximizes his expected profit, while guaranteeing the agent a transfer at least equal to his reservation wage for all realization of θ. Without loss of generality, the agent's reservation wage is normalized to zero. Let $q(\theta)$ be the agent's level of output when θ is realized. We denote by $w(\theta)$ the corresponding wage payment from the principal to the agent. Finally, we consider a linear utility function for the agent, which is given by $u(\theta) = w(\theta) - c(\theta, q)$.

2.2 The Symmetric Information Case

It does seem reasonable that principals will have better information (or at least some prior beliefs) about the characteristics of family members than they do about the characteristics of strangers. But even in presence of family members, it is also clear that the asymmetric information which may result from the agent's possibility to dissimulate his true type does not really disappear. As we will show, this is the joint role of family altruism and private information which explains why family firms are expected to perform better. Nevertheless, we first examine the case of symmetric information between the principal and the agent (either insider or outsider). Although this may appear as a very restrictive setting, certainly unrealistic in the context of a production problem, it allows us to disentangle the role of information and altruism on the performance of firms.

Our purpose in this subsection is to investigate how the identity of the agent, either a family member or an outsider, affects the optimal contract under symmetric information. This assumption simply means that the labor contract is necessarily the first-best. Recalling that the central difference between a family firm and a non-family firm is only linked to altruistic considerations with respect to the agent, this implies two different maximization programs, depending on the type of firm (or equivalently depending on the agent's identity, outsider or insider).

Let us begin with the standard case of a principal which hires an outsider. Hence, he does not behave in a benevolent way, and the egoistic principal seeks to maximize the level of profit function Π subject to the individual rationality (IR) constraint. In that case, the maximization program P_0 for the principal is :

$$(P_0) \qquad \underset{q(.),w(.)}{\text{Max}}\ \Pi = v(q(\theta)) - w(\theta) \quad \text{s.t} \quad w(\theta) - c\big(\theta, q(\theta)\big) \geq 0 \quad \text{(IR)} \qquad (1)$$

According to the IR participation constraint, the wage received by the agent should at least compensate the cost involved by the production process.

Now, we turn to the case of an insider. Since the principal is altruistic, we denote by β the corresponding caring parameter, with $0 < \beta < 1$.If $\beta > 1$, the altruistic principal would give more or equal weight to the agent's marginal utility than to his own. In a dynamic setting, it is well known that such cases lead to non-bounded dynastic utility.

This parameter is a measure of the weight attached to the agent's utility in the principal's objective function. Hence, the maximization program $P1$ for a family firm can be expressed as :

$$(P_1) \qquad \underset{q(.),w(.)}{\text{Max}} \sum = v(q(\theta)) - w(\theta) + \beta u \quad \text{s.t} \quad u = w(\theta) - c\big(\theta, q(\theta)\big) \geq 0 \quad \text{(IR)} \qquad (2)$$

where Σ indicates the family level of well-being. The difference between P_0 and P_1 is related to the presence of altruistic feelings towards the agent when the latter is a family member. Clearly, when the altruistic parameter is equal to 0, the program P_1 is equivalent to P_0 . For the sake of comparison, we make the implicit assumption that both types of agents (insider and outsider) are characterized by the same productivity parameter θ. We can now prove that in a setting of symmetric information, altruism plays no role in the determination of the optimal contract.

Proposition 1

Under symmetric information, the optimal contract does not depend on the agent's identity, outsider or insider. In both cases, the first-best contract is given by:

i) $v'(q(\theta)) = \frac{\partial c(\theta, q*(\theta))}{\partial q(\theta)}$

ii) $w^*(\theta) = c(\theta, q^*(\theta))$

Proof:

Let us first assume that the agent is an outsider. In that case, from the Lagrangian associated to P_0 (λ_0 being the multiplicator of Lagrange),

$$\mathcal{L}_0 = v(q(\theta)) - w(\theta) + \lambda_0 . [w(\theta) - c(\theta, q(\theta))]$$

we deduce from the first-order condition $\partial\mathcal{L}_0/\partial w = 0$ that $-1+\lambda_0 = 0$. Since $\lambda_0 = 1 > 0$, it implies that $w(\theta) = c(\theta, q(\theta))$. As a consequence, we get $\mathcal{L}_0 = v(q(\theta)) - c(\theta, q(\theta))$, so that the optimal production obtained by $v'(q(\theta)) = \frac{\partial c(\theta, q*(\theta))}{\partial q(\theta)}$.

Now, if the agent is an insider, the optimal solution given by the program P_1 is obtained through the Lagrangian $\mathcal{L}_1$ (λ_1 being the corresponding multiplicator) :

$$\mathcal{L}_1 = v(q(\theta)) - w(\theta) + \beta\, [w(\theta) - c(\theta, q(\theta))] + \lambda_1\, [w(\theta) - c(\theta, q(\theta))]$$

Hence, from the first-order condition $\partial\mathcal{L}_1/\partial w = 0$, we deduce that $-1 + \beta + \lambda_1 = 0$. Since $\lambda_1 = -\beta + 1 > 0$ and recalling that $\beta < 1$ by definition of altruistic preferences, we obtain again $\lambda_1 > 0$ and then $w(\theta) - c(\theta, q(\theta)) = 0$. The Lagrangian $\mathcal{L}_1$ becomes $\mathcal{L}_1 = v(q(\theta)) - c(\theta, q(\theta))$, which implies $v'(q(\theta)) = \frac{\partial c(\theta, q*(\theta))}{\partial q(\theta)}$. . QED

Let us interpret this proposition, which indicates that the type of contract is the same for both types of firms. From the definition of the first-best contract ($w*$, $q*$), we observe that the marginal benefit $v'(q*(\theta))$ is equal to the marginal cost $\partial c(\theta,q*(\theta))/\partial q$. Also, the cost of production $c(\theta, q*(\theta))$ is equal to the compensation $w*(\theta)$ for $\theta \in \Omega$. An additional comment is that there is no rent for the agent. Indeed, the participation constraint is binding for all types θ of agents at the equilibrium, both in family and non-family firms. Proposition 1 is a very important contribution with respect to the literature on family business. Assuming that the principal is able to have perfect information on the agent, we prove that introducing altruism in the production problem does not matter for the optimal contract. Thus, altruism itself is not sufficient to explain why family firms perform better.

Nevertheless, in the modern theory of production, the prevalent setting is that principals have only imperfect information on the agents' behavior (see Laffont and Tirole,1993). We now relax the assumption of perfect information in our production problem and prove that both altruistic feelings and informational asymmetry explain why performance in family firms is different from performance in other types of firms.

3 Labor Contract under Asymmetric Information

We now turn to the case where the principal is induced to hire an agent who is characterized by unknown preferences. Considering that the agent is in a position to dissimulate some characteristics which are likely to affect his own performance is standard in such setting. The assumption of asymmetric information is well acknowledged when the principal hires an outsider. But despites of the strength of family ties, it is also clear that information revelation due to long-term family relationships is unable to perfectly operate. As claimed in Fama and Jensen (1983), altruism exposes family firms to adverse selection. The consequences of accounting for imperfect information in the context of family relationships have recently been examined (Chami, 1996, 1998, Gatti, 2000, Jellal and Wolff, 2003, Villanueva, 2001). We extend these developments to the production framework by investigating the role of altruism on the second-best contract.

3.1 The second-best contract with an outsider

We first consider that the principal hires an outsider which has private information on his productivity parameter θ. The principal knows that it is in the interest of the manager to hide this information.

While the principal is unable to observe the type of agent θ, we make the assumption that the principal has information about the range of efficiency parameters $\theta \in [\theta; \theta]$, and also about the associated distribution $F(\theta)$. Given the presence of asymmetric information, the principal's maximization program is affected. If the ownership attempts to implement the fist best solution described in proposition 1, the agent has an incentive to overstate the parameter θ in order to obtain an informational rent. Hence, in the design of the optimal contract, the principal is constrained to make contracts menu contingent on variables that are verifiable and observable to both parties. In our simple setting, the optimal contract is made contingent on the level of production.From the literature on incentive contracting and the revelation principle (Laffont and Tirole, 1993), one can restrict the search to the class of mechanisms that induces a truthful revelation of the agent's parameter θ. In the context of our model, any optimal mechanism M that induces a truthful reporting can be represented as :

$$M = < q(\theta), w(\theta) > \Omega \qquad (3)$$

The principal offers a menu of type-revealing contracts with the definitions of $q(\theta)$ and $w(\theta)$, and the agent is expected to choose one of these self-selection contracts. Considering a mechanism $M(\theta)$, let $u(\tilde{\theta},\theta)$ be the net level of satisfaction that is achieved by an agent of type θ if he reports the type $\tilde{\theta}$. Without loss of generality, the reservation payoff is set to zero.

Hence, the rent $u(\tilde{\theta},\theta)$ for the agent is :

$$u(\tilde{\theta},\theta) = w(\tilde{\theta}) - c(\theta, q(\tilde{\theta})) \qquad (4)$$

Finally, we denote by $u(\theta) = u(\theta,\theta)$ the situation according to which the efficiency type of the agent is truthfully reported.

Under asymmetric information, there are two constraints in the determination of the principal's maximization program. Firstly, the requirement of truthful reporting gives the incentive compatibility constraint (IC) such that $u(\theta) \geq u(\tilde{\theta},\theta)$. Secondly, imposing the condition of individual rationality (IR), we have $u(\theta) \geq 0$. Thus, the principal's problem denoted by P_0^A (A stands for asymmetric information) is given by the maximization of his expected utility given the distribution function $F(\theta)$ under the incentive compatibility and the individual rationality constraints :

$$P_0^A \begin{cases} \text{Max}_{q(.),w(.)} \int_{\underline{\theta}}^{\overline{\theta}} \left[v\big(q(\theta)\big) - w(\theta)\right].dF(\theta) \\ s.t\ u(\theta) \geq u\big(\tilde{\theta},\theta\big) \qquad \text{(IC)} \\ \quad u(\theta) = u(\theta,\theta) \geq 0 \qquad \text{(IR)} \end{cases} \qquad (5)$$

We begin by a characterization of the class of contracts that satisfies the incentive compatibility constraint in order to implement the allocation < $q(\theta)$, $w(\theta)$ > in a dominant strategy.

Proposition 2

The second-best contract < $q(\theta)$, $w(\theta)$ > in a non-family firm satisfies the incentive constraint IC if and only if :

i) $u(\theta) = \int_{\theta}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\, dx$

ii) $q'(\theta) \leq 0$, $\forall\theta \in \Omega$

Proof:

From the definition of $u(\theta)$ such that :

$$u(\theta) = \sup_{\tilde{\theta}\in\Omega} u(\tilde{\theta},\theta) = w(\tilde{\theta}) - c(\theta, q(\tilde{\theta}))$$

$u(\theta)$ is an upper envelope of a linear function in θ, then it is convex and we have almost everywhere using the envelope theorem :

$$u'(\theta) = -\frac{\partial c(\theta, q(\theta))}{\partial\theta} < 0$$

$$u''(\theta) = -\frac{\partial^2 c\big(\theta, q(\theta)\big)}{\partial\theta\partial q} q'(\theta)$$

The necessary condition for a maximum is $u''(\theta) \geq 0$. Since $\partial^2 c(\theta, q(\theta))/\partial\theta\partial q \geq 0$ holds from assumption 2, we have $u''(\theta) \geq 0$ if and only if : $q'(\theta) \leq 0$.

Finally, one obtains $u(\theta)$ by integration of $u'(\theta)$ such that $u(\overline{\theta}) = 0$, which corresponds to the informational rent left to the type $\theta \in \Omega$. QED

Because of asymmetric information about the agent's ability parameter θ, the principal is forced to give up a costly rent to the agent which is used to discipline the agent into revealing his true efficiency type. In addition, the rent $u(\theta)$ is a decreasing function of the efficiency parameter θ. Hence, to be willing to reveal the agent's true type, the lower θ-type of agent must be rewarded with a more important rent value than the higher θ-type. The monotonicity condition $q'(\theta) \leq 0$ also implies a lower level of performance for inefficient agents in order to extract informational rent .Indeed , using assumption 2 (single crossing property), we get :

$$\frac{\partial}{\partial q} u(\theta) = \int_{\theta}^{\overline{\theta}} \frac{\partial^2 c(x,q(x))}{\partial x\partial q}\, dx > 0$$

Let us describe the components $q(\theta)$ and $w(\theta)$ of the optimal contract $M(\theta)$. We begin by the calculation of the wage level $w(\theta)$. Given the definition of the agent's utility $u(\theta) = w(\theta) - c(\theta, q(\theta))$, we obtain the following expression :

$$w(\theta) = c(\theta, q(\theta)) + \int_{\theta}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\, dx \qquad (6)$$

Now, we can insert this wage $w(\theta)$ in the profit function of the principal. Then, given the definition of the informational rent and integrating by parts, the expected profit denoted by $E\Pi$ becomes accordingly :

$$E\Pi = \int_{\underline{\theta}}^{\overline{\theta}} \left[v\big(q(\theta)\big) - c(\theta, q(\theta)) - \frac{F(\theta)}{f(\theta)}\frac{\partial c(\theta,q(\theta))}{\partial \theta}\right] dF(\theta) \qquad (7)$$

so that the principal's problem is to maximize $E\Pi$ subject to the monotonicity constraint $q'(\theta) \leq 0$.

Proposition 3

Under asymmetric information, the optimal contract for a non-family firm satisfies the following equalities :

i) $v'(q(\theta)) = \frac{\partial c(\theta,q(\theta))}{\partial q(\theta)} + \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c(\theta,q(\theta))}{\partial\theta\partial q(\theta)}$

ii) $w(\theta) = c(\theta, q(\theta)) + \int_{\theta}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\, dx$

Proof:

From the unconstrained optimization problem (7), we deduce from the corresponding first-order condition that $v'(q(\theta)) - \frac{\partial c(\theta,q(\theta))}{\partial q} - \frac{F(\theta)}{f(\theta)}\frac{\partial c\big(\theta,q(\theta)\big)}{\partial\theta\partial q} = 0$. Part i) of proposition 3 is given by the transfer in the equation (6).

Now, we have to show that the previous solution satisfies the monotonicity constraint defined by $q'(\theta) \leq 0$. Let $\Gamma(\theta, q(\theta))$ be a function such that :

$$\Gamma(\theta, q(\theta)) = v'(q(\theta)) - \frac{\partial c(\theta,q(\theta))}{\partial q} - \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\big(\theta,q(\theta)\big)}{\partial\theta\,\partial q}$$

Thus, we have sgn $(q'(\theta))$ = sgn $\left(\frac{\partial\Gamma}{\partial\theta}\,(\theta, q(\theta)\right)$. We get the following derivative :

$$\frac{\partial\Gamma}{\partial\theta}\,\big(\theta, q(\theta)\big) = -\frac{\partial c(\theta,q(\theta))}{\partial q\partial\theta} - \frac{F(\theta)}{f(\theta)}\frac{\partial c^3 c\big(\theta,q(\theta)\big)}{\partial\theta^2\partial q} - \frac{d}{d\theta}\left(\frac{F(\theta)}{f(\theta)}\right)\frac{\partial^2 c\big(\theta,q(\theta)\big)}{\partial\theta\,\partial q}$$

Clearly, we have $\partial\Gamma(\theta,q(\theta))/\partial\theta \leq 0$ because of assumptions 2, 4 and 5, so that the monotonicity condition is satisfied. QED

It is now possible to draw a more complete description of the production process. Clearly, the second-best level of output under asymmetric information is lower than the first-best level. The explanation concerning the distortion in $q(\theta)$ is that the imitation of inefficient types by efficient agents is undesirable. When the principal reduces the level of production, an agent of type θ finds it less favorable to mimic the type $\tilde{\theta}$.

3.2 The Second-Best Contract with an Insider

To compare the relative performance of non-family and family firms, we turn to the case of an insider. This modifies the principal's maximization program, since he now accounts for the well-being of the agent instead of focusing on the pure profit.

When the manager (a family member) has private information on the productivity parameter θ, the optimal contract is again made contingent on the level of production and any optimal mechanism M inducing a truthful reporting is given by $M = \langle q(\theta), w(\theta) \rangle \Omega$. Recalling that the principal seeks to maximize the augmented utility $\Sigma = \Pi + \beta u$ with $\Pi = v(q(\theta)) - w(\theta)$ and $u = w(\theta) - c(\theta, q(\theta))$, we can express the objective function Σ as:

$$\Sigma = v(q(\theta)) - c(\theta, q(\theta)) - (1 - \beta)u \qquad (8)$$

The interpretation of the last term is as follows. In (8), the term $(1 - \beta)$ may be seen as the weight devoted to the costly rent u left to the agent owing to private information. When the principal is characterized by a very high degree of altruism with respect to the agent, the parameter β is close to one and the cost of the rent for the principal tends to be very low.

In this setting, the principal's problem denoted by P_1^A is given by the maximization of the following expected utility, again subject to the incentive compatibility and the individual rationality constraints:

$$P_1^A \begin{cases} \mathrm{Max}_{q(.),w(.)} \int_{\underline{\theta}}^{\overline{\theta}} [v(q(\theta)) - c(\theta, q(\theta)) - (1 - \beta)u(\theta)].dF(\theta) \\ \qquad s.t\ u(\theta) \geq u(\tilde{\theta}, \theta) \qquad \text{(IC)} \\ \qquad\quad u(\theta) = u(\theta, \theta) \geq 0 \qquad \text{(IR)} \end{cases} \qquad (9)$$

so that implementing the allocation < $q(\theta)$, $w(\theta)$ > in a dominant strategy leads to the following proposition.

Proposition 4

Under asymmetric information and given family altruism, the optimal contract for an insider is given by :

i) $v'(q(\theta)) = \frac{\partial c(\theta, q(\theta))}{\partial q(\theta)} + (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c(\theta, q(\theta))}{\partial\theta\partial q(\theta)}$

ii) $w(\theta) = c(\theta, q(\theta)) + \int_{\theta}^{\overline{\theta}} \frac{\partial c(x, q(x))}{\partial x}\, dx$

Proof:

It is analogous to the proof of Proposition 3. QED

To interpret this result, we note that part ii) of proposition 4 can be expressed as :

$$v'(q(\theta)) + \beta\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c(\theta, q(\theta))}{\partial\theta\partial q(\theta)} = \frac{\partial c(\theta, q(\theta))}{\partial q(\theta)} + \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c(\theta, q(\theta))}{\partial\theta\partial q(\theta)} \quad (10)$$

The left hand side of (10) is the marginal benefit in terms of family utility, while the right hand side corresponds to the marginal cost of production which accounts for the costly rent. With respect to the case of a non-family firm, the marginal benefit is now higher and the magnitude of its increase depends on the value of the caring parameter $\beta > 0$, this case is then a generalization of the previous subsection, an outsider being characterized by a caring parameter $\beta = 0$. When choosing the optimal level of production, the altruistic principal which operates in a family firm accounts for an additional altruistic marginal benefit, so that he is induced to set a higher level of production. Interestingly, in the case of perfect altruism (β = 1), one can note that the optimal allocation is given by its first-best value $v'(q(\theta)) = \partial c(\theta, q(\theta))/ \partial q$. In that case, altruism perfectly neutralizes the adverse effect of asymmetric information.

Corollary 1

Under asymmetric information, the optimal contract depends on the agent's identity (insider or outsider), and family firms perform better.

This results stands in contrast with the case of symmetric information, where altruistic feelings between the agent and the principal did not influence the optimal contract . As one relaxes the assumption of perfect information, agents are expected to receive informational rent, so that the principal is more likely to leave the costly rent to the agent within a family firm since altruism decreases the marginal cost of the rent. As long as $\beta > 0$ (and assuming that both the insider and the outsider are characterized by the same value for θ), it follows that a higher level of production is expected from a family agent.

So, the main conclusion of this section is that under asymmetric information, a family firm should be more performant because of altruism. Importantly, this is the combination of altruism and imperfect information which gives rise to the superiority of family business. The recruitment of family members is then a self-selection device given the structure of information between the principal and the agent and the particular form of preferences for family members. In so doing, the ownership of a firm is expected to increase the firm's profitability, depending on the strength of family ties.

4 Labor Contract with Delegation

While the principal-agent setting is relevant for small family firms (for instance when the agent is a worker or with sharecropping contracts), it is important for larger corporations to account for their hierarchical structure. In that case, family members have a role to play in family business, dealing with supervisory tasks : the ownership may recruit a family member as the supervisor of a firm with an external manager. We now extend our analysis to the case of a three-layer hierarchy and examine how the information structure affects the performance of family firms.

Following the insightful contributions of Tirole (1986) and Laffont (1990), we extend the principal-agent model by including a third party, the supervisor. This situation, in which the principal is able to acquire information about the agent from the supervisor's report, gives rise to the possibility of collusion between the supervisor and the agent in order to manipulate the information sent to the principal. We assume that the principal is the ownership of a firm, the supervisor may be a family member or an outsider, and the agent is the manager of the firm. There are two possibilities for the supervisor. He may either be a family member whose preferences are known to the principal or a nonfamily member with unknown preferences. In the latter case, the supervisor's degree of honesty is unobservable, but the principal anticipates that the supervisor is tempted to collude with the agent. The structure of the model is as follows.

The principal is interested in controlling the agent's activity. He wants to have information about the type of agent, given by the efficiency parameter θ. So, the principal hires a supervisor to monitor the action of the agent and the principal offers a contract to the supervisor to discipline the agent. Before contracting takes place, the supervisor learns the type of agent. The role of the supervisor is to make a report to the principal, whose content is a valuable source of information for the principal. Then, the supervisor receives a payment which depends on the report made to the principal. The role of the supervisor is linked to the definition of an imperfect technology on verifiable information about the type of agent (Tirole, 1986, Laffont and Rochet, 1997).Since monitoring activities are too costly for the principal, the use of the technology has to be delegated to an intermediary who must be given appropriate incentives.

The report, which indicates the type of agent (less or more efficient), may be untruthful if the supervisor and the agent agree to collude. The report can only be untruthful if the two previous parties agree on sending a falsified report to the principal (see Kofman and Lawarée, 1993). When collusion occurs, it is accompanied by a covert transfer from the agent to the supervisor. This transfer is part of an enforceable side contract between the supervisor and the agent. This contract includes the amount of covert transfer which is transferred from the agent to the supervisor. We denote by σ the state of information obtained by the supervisor about the type of agent, characterized by the parameter θ. Following Tirole (1986), we assume that the signal σ is hard information. This means that if $\sigma = \theta \in \Omega$ and the supervisor reveals the signal to the principal, then it is convincing evidence. Now, let r be the supervisor's report to the principal. Hence, the report is defined by $r \in \{\sigma; \emptyset\}$. On the one hand, when $\sigma = \emptyset$, the supervisor learns nothing about the type of agent, so that the supervisor can only report that he has no information. On the other hand, when $\sigma = \theta$, the supervisor observes the true type of agent θ. Hence, according to his own preferences, the supervisor can either tell the truth $r = \theta$ to the principal or send a falsified report $r = \emptyset$. Concealing information is a degree of discretion for the supervisor.

Now, let ζ be the probability that the supervisor gets information about the true type of agent $\theta \in \Omega$. With probability $1-\zeta$, the supervisor observes nothing. The probabilities are such that $\Pr(\sigma = \theta \in \Omega) = \zeta$ and $\Pr(\sigma = \emptyset) = 1-\zeta$. In this delegation game, we denote the supervisor's utility function by the following function :

$$V(s) = s \tag{11}$$

where s is the wage received by the supervisor for a given effort of investigation, again, the reservation wage is normalized to zero.

When the supervisor observes the true value $\sigma = \theta \in \Omega$, the agent has an incentive to collude with the supervisor. When the agent is discovered with evidence, he is expected to offer a side contract to the supervisor in exchange of the dissimulation of the true parameter θ (see Tirole, 1986). The agent bribes the supervisor to convince the supervisor to conceal his information and report instead that he has observed nothing, i.e. $r = \emptyset$.To suppress reporting, the side contract specifies an amount of covert transfer b from the agent to the supervisor. When the supervisor accepts the side contract, we assume that he faces a psychological cost given by the parameter ψ. Such formalization is novel with respect to the existing literature on mechanism design.

Clearly, we account in our setting for the place of moral values in preference systems. In economic theory, a standard approach is to assume that agents feel moral disutility when they attempt to infringe social conventions. Morality can directly enter into the individual's utility function through negative feelings or be incorporated by the use of lexical preferences. In Besley and McLaren (1993), honest agents never accept bribes and they regard their integrity as priceless. Also, Andvig and Moene (1990) consider the presence of a psychic cost in terms of guilt and moral disgust when acting against the moral convention. More honest people are expected to get more disutility from bribery, since they attach a greater weight to the costs associated with collusion and the possibility of personal disgrace if caught. With bribery between the supervisor and the agent, the supervisor's utility is :

$$V = b - \psi \tag{12}$$

When the supervisor is an insider (a family member), the principal has a precise idea on the degree of the psychic cost ψ. Indeed, due to family values, transmissions of attitudes and educational efforts, the parameter ψ may be seen as the outcome of preference shaping behavior. In the study of intergenerational transmission mechanisms, the role of the parents in the formation of the children's outcome has been widely shown. A first channel deals with the role of both genetical and cultural transmission, so that a child is more likely to behave as his parents. Parents influence the experiences of their children during the formative early years, and adult behaviors are then strongly correlated with childhood experiences (see Becker, 1993, 1996, Bisin and Verdier, 2001, Jellal and Wolff, 2002, Mulligan, 1997). A second channel occurs through human capital transmission (Becker and Tomes, 1986, Behrman et alii, 1995). Parents devote a lot of financial and time-related resources to the child's education, so that they can observe during many years the effort at school of the progeny and whether children obtain good results. It follows that a higher value for ψ indicates a more honest and loyal behavior.For an insightful investigation of the role of guilt, shame, and norms within the firm, see Kandel and Lazear (1992) and Lazear (1995). Guilt and shame provide effort incentives. A polar case is given by $\psi = +\infty$, which is equivalent to a guaranteed perfect honesty. This parameter ψ may be interpreted as a discounted loss of reputation or disinheritance for the supervisor. The role of honesty-shared values in family firms is closely related to the recent and growing literature on endogenous preferences (see Becker, 1996, Bowles, 1998, Mulligan, 1997). In the family context, parents attempt to instill desirable values in their children. By influencing the experiences of the children during the formative early years, parents also affect adult preferences and choices due to habits acquired in childhood. Then, parents have to account for the connection between childhood experiences and adult children when they inculcate moral values into the children. For example, according to Akerlof (1983) and Frank (1988), the best way to appear altruistic is to actually behave in an altruistic way, so that such a genuine altruism is likely to rub off on the children. Instilling guilt in children is expected to influence both work effort and other types of behavior (Weinberg, 2001). Favoring honesty and loyalty is a worthwhile issue since it is the major factor in the success of family firms. For a given identity of the supervisor, the timing of the labor contract in the three-layer hierarchy is given by the following sequence :

i)the agent learns privately θ, the supervisor learns σ, and the agent also learns σ ;

ii) the principal offers the supervisor and the agent a grand contract, which is a mechanism specifying $< q, w, s >\Omega$;

iii) the agent and the supervisor can sign a side contract specifying a side transfer, which depends on the message and report by the agent and the supervisor in the context of the grand contract ;

iv) contracts are implemented.

As a benchmark case, we study the case of a contract with no collusion. Thus, we determine the optimal grand contract when the principal has a “super-supervisor”. Such a supervisor is characterized by a flat income $s = 0$ and the saint-supervisor always reports truthfully. Such a situation would correspond to the case of a perfectly inculcated family member . For example, a parent may devote a huge amount of time-related and financial resources to give his child a strict education. With this transmission of moral values, a child would be expected to behave as an incorruptible supervisor. Also, the supervisor may be concerned with the transmission of his wealth or with the sale of the firm, so that he is induced to keep a more performant firm. Owning a family firm is part of a long-term (dynastic) capital strategy. When preference shaping succeeds, the cost of collusion is given by the value $\psi = +\infty$. In this situation, the ownership of a family business would certainly place an important demand for having children, since this allows the principal to have a perfect control on the firm's management. Efforts in preference shaping behavior translate into a higher prosperity for the family business.

Proposition 5

When the principal hires a saint-supervisor, decentralization of information dominates centralization.

Proof :

When there is no supervisor, the expected profit for the firm is given by :

$$E\Pi_c = \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)\right) - \frac{F(\theta)}{f(\theta)} \frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial \theta} \right] dF(\theta)$$

where c as subscript characterizes centralization and $q_\phi(\theta)$ indicates the level of output under asymmetric information .In the three-layer hierarchy, the agent is always a nonfamily member, so that the type of agent remains always unknown to the principal when there is no supervisor . Thus, this is also the level of performance of the agent when the signal of the supervisor is not informative, i.e. $\sigma = \emptyset$ with probability $(1 - \zeta)$.

With a truthful supervisor, the expected profit for the principal is:

$$E\Pi_d = \zeta \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\theta(\theta)\right) - c\left(\theta, q_\theta(\theta)\right)\right) \right] dF(\theta)$$

$$+ (1 - \zeta) \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)\right) - \frac{F(\theta)}{f(\theta)} \frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial \theta} \right] dF(\theta)$$

where d as subscript stands for decentralization and $q_\theta(\theta)$ is the level of output when $\sigma = \theta$ with probability ζ. Thus, the expected profit is greater under delegation than under centralization when the following inequality holds :

$$\int_{\underline{\theta}}^{\overline{\theta}} [v(q_\theta(\theta)) - c(\theta, q_\theta(\theta)))]dF(\theta)$$

$$> \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)) - \frac{F(\theta)}{f(\theta)} \frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial \theta} \right] dF(\theta)$$

Since we have $q_\theta(\theta) \geq q_\phi(\theta) \;\; \forall \theta \in \Omega$ and $\partial c / \partial \theta > 0$, the previous inequality holds and thus we arrive at the result that $E\Pi_d > E\Pi_c$. QED

Let us comment this result. When the supervisor is a family member, the principal acts as an altruist since he maximizes the utility function defined as the sum $\Pi + \beta V(s)$. Since the supervisor always reports truthfully, he receives a wage $s = 0$ and hence $V(s) = 0$. As a consequence, if the principal has a family member who behaves as a trusty supervisor, the principal would always hire this family member under delegation. However, assuming a complete sainthood of supervisor is an extreme case, even with the focus on family members. Indeed, the use of preference shaping mechanisms is costly, and this cost may lead to only a partial honesty of family members**.** The role of personnel characteristics on hiring is further examined in Lazear (1995). Given the possibility of bribery due to imperfect honesty, we have to examine the behavior of the principal when collusion between the supervisor and the agent occurs.

5 The Pattern of Optimal Collusion

We now suppose the presence of a supervisor of type ψ in a setting of perfect information. The type of supervisor is perfectly known by the principal. Hence, in order to deter collusion between the agent of type θ and the supervisor of type ψ, the principal takes into account the collusion-proofness constraint which may be expressed as :

$$s(\theta) \geq u(\theta) - \psi \tag{13}$$

where $s(\theta)$ is the wage offered to the supervisor when reporting $\sigma = \theta$, and $u(\theta) - \psi$ is the net gain when the agent of type θ characterized by the informational rent $u(\theta)$ bribes the supervisor. The latter accepts the side contract if and only if the net benefit expected from collusion is greater than the level of wage proposed by the principal. Therefore, the principal does not leave scope for collusion with the following salary:

$$s(\theta) = u(\theta) - u(\theta^0) \tag{14}$$

where $\psi = u(\theta^0)$. Using the definition of $u(\theta)$, we can write ψ as :

$$\psi = \int_{\theta^0}^{\overline{\theta}} \frac{\partial c(x, q(x))}{\partial x} \, dx \tag{15}$$

We are now in a position to characterize occurrence of collusion in this model.

Corollary 2

The principal offers a lower wage to the supervisor when the psychological cost ψ is important. Since the supervisor is corruptible with probability $Pr\ (\theta \leq \theta^0\ (\psi)) = F\ (\theta^0(\psi))$ more honest supervisors deter occurrence of collusion.

Thus, a supervisor of type ψ is tempted to collude with the more efficient types of agents, whose informational rent $u(\theta)$ is sufficiently important to bribe the supervisor's honesty. However, the principal is aware of the proportion of agents who are able to make the supervisor against his primary objective, namely to make an honest report when discovering agents. Clearly, $F(\theta^0(\psi))$ is a decreasing function of the parameter ψ . Indeed, using equation (15) , it follows that :

$$\frac{d\theta^0}{d\psi} = -\left(\frac{\partial c\left(\theta^0(\psi), q(\theta)\right)}{\partial \theta}\right)^{-1} < 0$$

Our analysis sheds light on the role of culture and preference shaping within the family. As a prediction, collusion is less probable when the supervisor hires a family member, in particular with a child given the stronger parent-child ties and interactions. The parent is induced to hire the most able child. During childhood, parents have the opportunity to inculcate an honest behavior (either trusty or altruistic) in their children. Some authors have shown that even large organizations attempt to cultivate corporate culture (Cremer, 1993, Kreps, 1990, Hermalin, 2001). The role of corporate culture is to have a better control over employees, by instilling in them feelings of loyalty and integrity (Kandel and Lazear, 1992). In so doing, it is possible for large organizations where the turnover rate is low to experience more success in shaping behavior (Akerlof, 1983, Mulligan, 1997).

Proposition 6

The collusion proofness is given by the following allocations :

i) $\forall \theta \leq \theta^0, v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q\,(\theta)} + (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q\,(\theta)}\left[1 + (1-\beta)\frac{\zeta.}{1-\zeta.}\right]$

ii) $\forall \theta > \theta^0, v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q\,(\theta)} + (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q\,(\theta)}\left[1 + (1-\beta)\frac{\zeta.}{1-\zeta.}\frac{F(\theta^0)}{f(\theta)}\right]$

Proof :

When the preferences of the supervisor are known by the principal, the level of well-being for the principal Σ is defined by :

$$\Sigma = (1-\zeta)\int_{\underline{\theta}}^{\overline{\theta}}\left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)\right) - u(\theta)\right] dF(\theta) + \zeta\int_{\underline{\theta}}^{\overline{\theta}}\left[v\left(q_\theta(\theta)\right) -\right.$$

cθ,qθθ−sθ+βV(sθ)dFθ

The first term of the sum is when the supervisor has no information about the type of agent, so that $\sigma = r = \varnothing$ and hence $s(\varnothing) = 0$. According to second term of the sum, the supervisor is rewarded with $s(\theta)$ for reporting $r = \theta$ when $\sigma = \theta$ (with probability ζ), and the parameter β indicates the intensity of altruism given by the principal to the supervisor. In addition, we have $V(s) = s$, the side payment $s(\theta) = u(\theta) - u(\theta^0)$ can be expressed as:

$$s(\theta) = \int_{\theta}^{\theta^0} \frac{\partial c(x, q(x))}{\partial x}\, dx$$

and the threshold value θ^0 is such that $\psi = \int_{\theta^0}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\, dx.$

Thus, for the sake of simplicity ,we drop θ as an argument in the notation of the following the expected welfare for the principal is :

$$E\boldsymbol{\Sigma} = (1-\zeta)\int_{\underline{\theta}}^{\theta^0}\left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)\right) - \frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right] dF(\theta) +$$

$$(1-\zeta)\int_{\theta^0}^{\overline{\theta}}\left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)\right) - \frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right] dF(\theta) +$$

$$\zeta\int_{\underline{\theta}}^{\theta^0}\left[v\left(q_\theta(\theta)\right) - c\left(\theta, q_\theta(\theta)\right)\right) - (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right] dF(\theta) +$$

$$\zeta\int_{\theta^0}^{\overline{\theta}}\left[v\left(q_\theta(\theta)\right) - c\left(\theta, q_\theta(\theta)\right)\right) - \right] dF(\theta)$$

Now, the problem for the principal is to solve :

$$\mathrm{Max}_{(\theta^0, q_\theta(.))} \quad E\,\Sigma$$

$$\text{s.t} \quad \psi = \int_{\theta^0}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\, dx$$

Let L be the corresponding Lagrangian, such that :

$$L = E\Sigma - \lambda\int_{\theta^0}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x}\frac{1}{f(\theta)}\, dF(\theta)$$

where λ is the multiplicator associated to the constraint $\psi = \int_{\theta^0}^{\overline{\theta}} \frac{\partial c(x,q(x))}{\partial x} dx$.The first order condition $\partial L/\partial\theta^0 = 0$ is :

$$-\zeta(1-\beta)\frac{F(\theta^0)}{f(\theta^0)}\frac{\partial c\left(\theta^0, q_\phi(\theta^0)\right)}{\partial\theta} + \lambda\frac{c\left(\theta^0, q_\phi(\theta^0)\right)}{\partial\theta}\frac{1}{f(\theta^0)}$$

so that we obtain :

$$\lambda = (1-\beta)\zeta F(\theta^0) > 0$$

Let us substitute this expression and then, by maximizing over $q_\phi(.)$ we arrive at the following result:

$$E\mathbf{\Sigma} = (1-\zeta)\int_{\underline{\theta}}^{\theta^0}\left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)) - \frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right]dF(\theta)$$

$$-\zeta\int_{\underline{\theta}}^{\theta^0}\left[(1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right]dF(\theta)$$

$$+(1-\zeta)\int_{\theta^0}^{\overline{\theta}}\left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right)) - \frac{F(\theta)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right]dF(\theta) +$$

$$-\zeta\int_{\theta^0}^{\overline{\theta}}\left[(1-\beta)\frac{F(\theta^0)}{f(\theta)}\frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right]dF(\theta)$$

From $\partial L/\partial q_\phi = 0$, we deduce that:

$\forall\theta \le \theta^0, v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q(\theta)} + (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q(\theta)}\left[1 + (1-\beta)\frac{\zeta.}{1-\zeta.}\right]$ and $v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q(\theta)} + (1-\beta)\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q(\theta)}\left[1 + (1-\beta)\frac{\zeta.}{1-\zeta.}\frac{F(\theta^0)}{f(\theta)}\right]$ when the nequality $\theta > \theta^0$ holds. QED

What is the meaning of this collusion proofness allocation ? When there is no supervisor, the optimal solution is given by :

$$v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q(\theta)} + \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q(\theta)}$$

In the centralization case, the marginal benefit $v'\left(q_{\phi}(\theta)\right)$ is equalized with the sum of the marginal cost of production $\frac{\partial c(\theta,q_{\phi}(\theta))}{\partial q(\theta)}$ and the informational marginal cost $\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q(\theta)}$.

We can note that a same result is reached with a saint-supervisor, who always reports truthfully the information. Indeed, with $\sigma = \theta \in \Omega$, we have $r = \sigma$ with probability ζ. The supervisor receives $s = 0$ and the principal implements $q_{\theta}(.)$ such that : $v'\left(q_{\theta}(\theta)\right) = \frac{\partial c(\theta,q_{\theta}(\theta))}{\partial q(\theta)}$. This is the first-best solution. But if $\sigma = \emptyset$, the report is $r = \emptyset$ with probability $(1-\zeta)$, so that the principal implements $q_{\phi}(.)$ which is given by :

$$v'\left(q_{\phi}(\theta)\right) = \frac{\partial c(\theta,q_{\phi}(\theta))}{\partial q(\theta)} + \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q(\theta)}$$

This is the second-best solution, which allows a rent extraction of the less inefficient type of agent.

Now, let us denote by $\Gamma(\theta, q_{\phi}(\theta)))$ the net marginal benefit for the principal :

$$\Gamma(\theta,q_{\phi}(\theta))) = v'\left(q_{\phi}(\theta)\right) - \frac{\partial c(\theta,q_{\phi}(\theta))}{\partial q(\theta)} - \frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q(\theta)}$$

which allows us to examine the collusion proof solution. Using the definition of $\Gamma(\theta, q_{\phi}(\theta)))$, we can write the optimal conditions given in proposition 2 as follows :

$$\Gamma_0\left(\theta, q_{\phi}(\theta)\right) = (1-\beta)\frac{\zeta}{1-\zeta}\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q(\theta)} \qquad \forall\theta \leq \theta^0$$

$$\Gamma_1\left(\theta, q_{\phi}(\theta)\right) = (1-\beta)\frac{\zeta}{1-\zeta}\frac{F(\theta^0)}{f(\theta)}\frac{\partial^2 c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q(\theta)} \qquad \forall\theta > \theta^0$$

There are two regimes for the efficiency type θ, i.e. $\Omega_0 = [\underline{\theta};\theta^0]$ and $\Omega_1 =]\theta^0;\overline{\theta}]$. Let us recall that the type of supervisor ψ is corruptible when he encounters the type of agents $\theta \leq \theta^0$, whose proportion is given by $F(\theta^0)$.This is a general result with respect to the previous contributions of Tirole (1986, 1992), since there are a continuum of type $\theta \in \Omega$ and a continuum of type ψ in our model. Hence, one expects a greater threat of collusion in the first regime Ω0. Since the aim of the principal is to deter this collusion, the principal has to decrease the stake of collusion which corresponds to the informational rent for the agent when the supervisor hides his information.

Therefore, since collusion is more probable in Ω_0, the principal has to distort more the allocation in this interval, with a reduced performance level. In other words, the performance in Ω_0 is such that the net marginal benefit for the principal $\Gamma_0\left(\theta, q_{\phi}(\theta)\right)$ is equalized with the marginal cost of collusion between the ψ type of supervisor and the θ type of agent $\theta \in \Omega_0$, which is given by $(1-\beta)\frac{\zeta}{1-\zeta}\frac{F(\theta)}{f(\theta)}\frac{\partial^2 c\left(\theta, q_{\phi}(\theta)\right)}{\partial\theta\partial q\ (\theta)}$ .So, in Ω_0, avoiding collusion leads the principal to bribe the supervisor for reporting honestly the information, and such a measure is costly. As a consequence, more distortion in performance asked for agents is desirable, since it decreases the value of the informational rent and lessens the stake of collusion. We also note that i) the need for supervision is useless when $\zeta = 0$, ii) the possibility of distortion associated to the threat of collusion disappears when $\beta = 1$ (perfect altruism) since $\partial q_{\phi}(\theta)/\partial\beta > 0$ and the supervisor's salary is not costly, and iii) $\zeta/(1-\zeta)$ is a measure of the likelihood of collusion, $\frac{F(\theta^0)}{f(\theta)}$ is a sort of likelihood of being in the interval $\Omega_1 =]\theta^0; \overline{\theta}]$.

Now, let us consider the second regime with $\theta > \theta^0$. Given the previous definitions of $\Gamma_0\left(\theta, q_{\phi}(\theta)\right)$ and $\Gamma_1\left(\theta, q_{\phi}(\theta)\right)$, we can write the following equivalence :

$$\Gamma_1\left(\theta, q_{\phi}(\theta)\right) = \frac{F(\theta^0)}{f(\theta)}\Gamma_0\left(\theta, q_{\phi}(\theta)\right) \qquad \text{for all} \quad \theta > \theta^0$$

Since the ratio $\frac{F(\theta^0)}{f(\theta)}$ is always strictly lower than one, there is less distortion in the second regime. Indeed, in that case, it is less likely that a supervisor of type ψ collude with agents for $\Omega_1 =]\theta^0; \overline{\theta}]$ since the latter receive lower informational rent.

So far, we have analyzed the response of the principal to the potential collusion between the agent and the supervisor, whose preferences are perfectly known by the principal. This is more likely to be the case of a supervisor as a family member. We now examine the optimal grand contract when the preferences of the supervisor are unknown to the principal, which is more likely when the principal hires a nonfamily member.

6 Covert Transfer Under Asymmetric Information

Changing the information structure between the agent and the supervisor, we consider a setting where the principal has no information about the supervisor and the agent does not know the type of supervisor when proposing a side contract. The supervisor may be seen as a perfect stranger to the firm. In this situation, we have to solve a problem of collusion with side payment under imperfect information.

When $\sigma = \theta \in \Omega$, what is the condition for a supervisor to conceal information ? If we denote by $s(\theta)$ the wage offered by the principal to the supervisor when the latter reports the observed signal and $b(\theta)$ the amount of covert transfer from the agent to the supervisor, the supervisor of type ψ accepts the side contract offered by the agent if and only if the net benefit expected from collusion is greater than the wage proposed by the principal. Thus, the following condition must hold for the covert transfer $b(\theta)$:

$$b(\theta) - \psi \geq s(\theta) \tag{16}$$

In this setting, the type ψ of supervisor is unknown. We assume that the parameter ψ is the realization of a random variable characterized by the density function $\varphi(\psi)$ and the distribution function $\Phi(\psi)$ on the support $\Omega = [0;1]$. To get closed forms solutions, we further assume that the distribution function has the following form :

$$\Phi(\psi) = \psi^{\epsilon} \tag{17}$$

with $0 \leq \epsilon \leq 1$. Given the definition of $\Phi(\psi)$ and using (16), the probability that a coalition between the agent and the supervisor occurs may be expressed as :

$$\Pr\left(\psi \leq b(\theta) - s(\theta)\right) = \Phi(b(\theta) - s(\theta)) \tag{18}$$

where $(b(\theta) - s(\theta))$ indicates the surplus of the coalition. We note that the frequency of collusive behavior has a standard form in our problem. Indeed, the supervisor is more likely to accept a side contract from the agent when the latter offers a high value for the covert transfer. Conversely, the probability of collusion is a decreasing function of the level of wage paid by the principal to the supervisor.

The agent maximizes the following net expected utility :

$$\text{Max } \Phi(b(\theta) - s(\theta))[u(\theta) - b(\theta)] \tag{19}$$

Since the agent has no information about the type ψ of supervisor and since a truthful revelation by the supervisor to the principal lowers the agent's rent, the agent offers the following amount of covert transfer $b(\theta)$ to the supervisor given the distribution function :

$$\Phi(\psi) = \psi^{\epsilon}$$

Proposition 7

Under asymmetric information, the optimal side transfer from the agent to the supervisor is given by the following amount:

$$b(\theta) = \frac{\epsilon}{1+\epsilon}\, u(\theta) + \frac{1}{1+\epsilon}\, s(\theta)$$

With uncertainty about the type of supervisor, the agent proposes a side contract which induces the supervisor to misreport the signal to the principal. When the supervisor accepts the transaction with the agent, the optimal covert transfer is a linear combination of the rent $u(\theta)$ obtained by the agent and the wage $s(\theta)$ offered by the principal. The share of the agent's rent received by the supervisor is an increasing function of the fraction $\frac{\epsilon}{1+\epsilon}$. This latter value corresponds to the mean level of the psychic cost ψ for the supervisor, since we have $E(\psi) = \frac{\epsilon}{1+\epsilon}$. Since the probability of collusion is $\Pr(\psi \leq b(\theta) - s(\theta))$ and using the optimal covert transfer of proposition 7, we obtain the following equality $b(\theta) - s(\theta) = \frac{\epsilon}{1+\epsilon}(u(\theta) - s(\theta))$.

Corollary 3

Given the covert transfer, the optimal probability of collusion under asymmetric information is :

$$\Phi\left(\frac{\epsilon}{1+\epsilon}(u(\theta) - s(\theta))\right) = \left(\frac{\epsilon}{1+\epsilon}(u(\theta) - s(\theta))\right)^{\epsilon}$$

Collusion between the two parties is more likely when the retention of information by the supervisor benefits the agent. It is an increasing function of the rent $u(\theta)$ since $\partial\Phi/\partial u(\theta) > 0$. Besides, the probability of collusion is lowered by the level of salary offered by the principal to the supervisor, since the bribe becomes less attractive for the supervisor with $\partial\Phi/\partial s(\theta) < 0$. An additional comment concerns the interpretation of , which is an indicator of the elasticity of collusion between the supervisor and the agent. In our framework, the monetary value of the agent's collusive activity is endogenous.

The parameter ϵ is equivalent to the shadow cost λ of the lateral side transfer for the agent as defined in Laffont and Tirole (1993, chapter 11), using the equivalence $\lambda = 1/\epsilon$. Since the probability of collusion may be expressed as $\Phi((u(\theta)-s(\theta))/ 1+\lambda)$, we have $\lim_{\lambda\to\infty} \Phi(.) = 0$, meaning that an infinite shadow cost for the agent's transfer prevents from collusive behavior among a three-tier hierarchy.

Corollary 4

The Collusion proofness requires $s(\theta) = u(\theta) \quad \forall\theta \in \Omega$.

Using corollary 3, it is easy to see that no collusion occurs when $s(\theta) = u(\theta)$. So, what happens when the principal hires a nonfamily member as a supervisor? We remark that the collusion proofness is more costly since the equality $s(\theta) = u(\theta)$ holds $(\forall\theta \in \Omega)$.

This corresponds to a transfer of informational rent from the agent to the supervisor. As a consequence, it is in the interest for an ownership to include family members in the management of the corporation. While it is often argued that supervision by family members can be perceived as nepotism, we offer a different interpretation using the theory on incentives contracting. The rational of hiring supervisors among family members is simply the result of the reduced agency problem, in that it avoids collusive behaviors between supervisors and agents.

Proposition 8

The Collusion proofness in presence of a nonfamily supervisor requires the implementation of the following production allocation given by :

$$v'\left(q_\phi(\theta)\right) = \frac{\partial c(\theta, q_\phi(\theta))}{\partial q(\theta)} + \frac{F(\theta)}{f(\theta)} \frac{\partial^2 c\left(\theta, q_\phi(\theta)\right)}{\partial\theta\partial q(\theta)} \left[1 + \frac{\zeta.}{1-\zeta.}\right] \quad \forall\theta \in \Omega$$

Proof :

A mechanism that is robust to collusive behavior requires $s(\theta) = u(\theta)$. Since the supervisor is not a family member, the principal is no longer characterized by an altruistic behavior towards the supervisor and thus $\beta = 0$.

We can now calculate the expected profit for the principal as follows :

$$E\Pi = (1-\zeta) \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right) - u(\theta)\right] dF(\theta) + \zeta \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\theta(\theta)\right) - \right.$$

$c\theta,q\theta\theta-s(\theta)dF\theta$

so that the principal solves the following maximization over la quantity of production $q_\phi(\theta)$ problem :

$$\underset{q_\phi(.)}{\text{Max}}(1-\zeta) \int_{\underline{\theta}}^{\overline{\theta}} \left[v\left(q_\phi(\theta)\right) - c\left(\theta, q_\phi(\theta)\right) - \frac{F(\theta)}{f(\theta)} \frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right] dF(\theta)$$

$$- \zeta \int_{\underline{\theta}}^{\overline{\theta}} \left[\frac{F(\theta)}{f(\theta)} \frac{\partial c\left(\theta, q_\phi(\theta)\right)}{\partial\theta}\right] dF(\theta)$$

which leads to :

$$v'\left(q_{\phi}(\theta)\right)=\frac{\partial c\left(\theta,q_{\phi}(\theta)\right)}{\partial q\left(\theta\right)}+\frac{F(\theta)}{f(\theta)}\frac{\partial^{2}c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q\left(\theta\right)}\left[1+\frac{\zeta.}{1-\zeta.}\right]\quad \forall\theta\in\Omega\text{. QED}$$

For the interpretation, we use the function $\Gamma(\theta,\ q\emptyset)$, so that the previous solution can be expressed as :

$$\Gamma\left(\theta,q_{\phi}(\theta)\right)=\frac{\zeta}{1-\zeta}\frac{F(\theta)}{f(\theta)}\frac{\partial^{2}c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q\left(\theta\right)}\ ,\ \forall\theta\in\Omega$$

So, in the presence of an unknown supervisor, the principal is expected to distort more the performance asked to the agent along all the interval Ω. The distortion whose amount is given by $\frac{\zeta}{1-\zeta}\frac{F(\theta)}{f(\theta)}\frac{\partial^{2}c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q\left(\theta\right)}$ does not depend on the altruism parameter β. Moreover, it prevails for all type $\theta\in\Omega$. Conversely, under perfect information about the supervisor, the degree of altruism alleviates the distortion. As a consequence, the presence of an outsider supervisor entails a lower degree of performance within the firm. A final comment is the interpretation of the solution given in proposition 8. The marginal benefit $v'\left(q_{\phi}(\theta)\right)$is equalized with the sum of the marginal cost $\frac{\partial c\left(\theta,q_{\phi}(\theta)\right)}{\partial q\left(\theta\right)}$, the marginal cost of rent without collusion $\frac{F(\theta)}{f(\theta)}\frac{\partial^{2}c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q\left(\theta\right)}$ and the weighted marginal cost of avoiding collusion $\frac{\zeta}{1-\zeta}\frac{F(\theta)}{f(\theta)}\frac{\partial^{2}c\left(\theta,q_{\phi}(\theta)\right)}{\partial\theta\partial q\left(\theta\right)}$. Thus, our analysis may be seen as a direct generalization of the results obtained by Laffont and Tirole (1993) on collusion in regulation policies contexts.

7 Conclusion

In this paper, we have attempted to embed altruism in the context of the firm theory. Our central assumption is that altruism operates only in family firms. Parents are especially generous to their children not only because they love them, but also because their own level of well-being would decline if they acted in any different way as demonstrated by Becker (1991). Conversely, altruism is not present in a non-family business organization, and the ownership of a firm is only concerned with the maximization of the firm's profit in that case. Interestingly, non-family firms are often tempted to imitate family firms, in particular by promoting and 'producing' altruism through corporate culture (Hermalin, 2001). Our contribution is to show what role information plays in the presence of altruism in such hierarchical models of production.

Specifically, we show how altruism influences agency relationships in family firms. Altruism greatly helps to explain why the performance of family firms is often different from performance of other types of business organizations. Indeed, agency relationships are embedded in the strength of parent-child relationships. As pointed out by Pollak (1985), the main advantages of family governance are right incentives (claims on family resources), monitoring (owing to proximity), altruism and loyalty. Also, altruism compels parents to take care for their children and foster commitment to family firms. Specifically, this paper illustrates the claim of Simon (1993), according to whom altruism is expected to substantially change the theory of the firm.

Our results are two folds. On the one hand, we show that altruism only matters in a context of asymmetric information to determine the optimal production contract. Under symmetric information, no differences are expected between family and non-family firms, but the prevalent setting when dealing with production problems involves agency problems. On the other hand, we demonstrate that the issue of decentralization of information within a hierarchy matters when explaining the differential performances of the firms. Non-family firms have to devote more resources to the coordination of information within the hierarchical structure given the threat of collusion between members having relevant information. As a consequence, such private hierarchical firms would be less productive in terms of financial and innovation performances.

Finally, our analysis highlights the necessity to account jointly for social interactions within the firm and information aspects. So far, several studies have pointed out the role of altruism and trust both in the family and in the workplace (Mulligan, 1997, Rotemberg, 1994), but less attention has been devoted to their effects on the performance of firms. Our theoretical analysis, which is a contribution to the emerging formal literature on family business (Bhattacharya and Ravikumar, 2001, 2002, Chami, 2001) indicates that family ties may be good in terms of performance for the development of large firms. We believe that the expected positive impact of family altruistic relationships on the firm's performance is undoubtedly a central factor when explaining why family businesses are still the predominant form of business organization around the world.

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