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On the Limits of Nonprofit Firms

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2013

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SCHOOL OF ECONOMICS AND MANAGEMENT LUND UNIVERSITY

On The Limits of Nonprofit Firms

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INTRODUCTION

It is almost self-evident that the mode of production determines the weight of intrinsic motives as a production factor. This enquiry begins with the naïve observation that influence of intrinsic motives on quality should be negligible if the rhythm of production is entirely dictated by a machine in a standardized process. The actions of individuals are usually guided by more or less accentuated motives and aims but the nature and intensity of these are in economic terms particularly interesting in non-standardized production processes. Motivation management is primarily a matter of efficiency when main influence from effort exertion is restricted to product quantity. It becomes a serious concern once technology allows higher degrees of freedom regarding the content of the product, service or the production process itself.

The non-profit form is an example of an organization with room for alternative motives and behavior in absence of the profit maximizing condition which allows utilization of resources in accordance with the aims of the intrinsically motivated staff. This lack of restrictions may at the same time work against the aims of the funders if the staff does not share the same agenda. Such conflict of interest is at the core of the organization because its outcome decides the orientation of the whole enterprise. The resolution of this conflict is expressed in the institutional configuration of the firm, methods used or quality of inputs and outputs. The nature of this conflict is at the same time intangible because it concerns the ideas and ethics of the staff, especially those at key positions and these ideas do not always correspond to the codified and externally communicated mission. The more power over the production process and outcomes the staff potentially has, the more important it becomes with a consensus on the underlying values of the organization's mission. It is from this perspective the function of hierarchies, competition and screening institutions can be fully appreciated, these act as safeguards of a given agenda where formal rules are no more than ink on paper.

The discussion regarding nonprofits and intrinsically motivated agents has received attention among other reasons because of its potential to alleviate market failures in sectors afflicted by cost savings and behavior detrimental to quality in the presence of asymmetric information and non-contractible aspects of services. Shleifer (1998) argues for example that nonprofits can replace the state in sectors where quality is endangered by cost savings. Contributions like the one of Shleifer and Glaeser (2001) and Besley and Ghatak (2005) have emphasized different productive virtues of the nonprofit form and value oriented organizations driven by intrinsic motives.

Others have pointed out difficulties emanating from intrinsic motives with arguments which may be coarsely divided in two not necessarily mutually exclusive camps corresponding to the source of the problems: (i) By its nature, the intrinsically motivated organization deviates from its official aims in its pursuit to operate in accordance with its intrinsic motives, a position held among others by Dixit (2005) and Prendergast (2007) in the case of particular employees. (ii) Actors with different degrees of intrinsic motivation may interact in a way which results in adverse outcomes, a perspective employed by for example Canton (2005) who models motivational crowding out.

This research is at a more general level a study on the limits of organizations that facilitate altruistic behavior in the long run when organizational forms and personal attributes usually taken as given can change. The first paper describes institutional and cultural homogenization, a process where value oriented organizations may become similar to for profit firms. The second paper shows how the nature of human capital formation exposes altruism to opportunistic behavior in education. Both papers discuss how the development of personal traits is conditioned by the economical structure.

Value Oriented Organizations with Value Neutral Hierarchies is an inquiry on organizational responses by value-oriented firms to economic conditions. The paper shows how idealistic organizations undergo a transformation towards a hierarchical business-like structure in competitive environments. This adaptation process gives rise to common institutional arrangements and also shared culture characterized by a neutrality ethics among the management of the competing firms. The homogenization in terms of culture and organization can make nonprofits similar to profit firms even though they have different foundations.

Section two and three defines ethics on the basis of a revealed preference argument measured trough a model of interaction between a donor, manager and value oriented organization. The relationship of the manager and the value oriented organization is approximated by experiments such as the ultimatum game. What the manager prefers to do when faced with such a clear cut situation defines his ethics –we emphasize the link between the internal considerations of the manager and the actual outcomes or consequences of his ethical considerations.

Section four describes the institutional and cultural reactions to competition. Small or wealthy value oriented organizations can afford idealism and non-hierarchical structures but this solipsistic approach is abandoned in the presence of competition among similar firms when organization and firm culture becomes dictated by external considerations. Variations will exist but only as symbolic deviations within the well defined borders outlined by economical necessity.

The Citizen and the Educational System shows how the citizen is shaped by her interaction within the educational system at two distinct phases consisting of elementary and higher education. The efforts of the pupil and the investments made by elementary school at the first phase affect the ability of the citizen as a student at higher education, the sum of these efforts and investments constitutes human capital. The organization of the educational system must deal with externalities within and between these two distinct phases in an environment characterized by contract incompleteness.

Section three describes the model and establishes key concepts and definitions such as ability, preparation, knowledge and the educational regime. Human capital is perceived as the implied effort exertion by the citizen and investments made by the educational system as a consequence of strategic interaction over time. The incentives within classroom walls guiding

these actions are given by the *educational regime* defined as how dependent the student is relative to how caring the school is.

Section four shows how the educational regime and the citizen's ability to be forward looking determine learning outcomes.

Section five discusses the organization of the educational system. Education differs from the employer-employee case because neither effort nor grades can be contracted. Inter-firm relations are moreover complicated because the bearer of the externality in terms of ability is a free citizen who unlike a physical asset, can't be owned. These conditions therefore defy incentive contracts and asset ownership solutions under incomplete contracts, the intertemporal externalities open up for opportunistic behavior between schools at different stages of the educational system. An opportunistic high school may for example shirk on investments if it can rely on student effort and a good primary education. This opportunism therefore limits the scope of altruistic non-profits with the role of safeguards against cost-savings or commitment to a mission.

The game theoretical description of phenomena in this thesis naturally centers the discussion on Nash-equilibria, these should be interpreted as conventions in the long run rather than conscious solutions to maximization problems. Both papers deal with how organizations cope with uncontractible and dynamic characteristics of people but there are crucial differences between the two. The citizen is in contrast to the manager both input and producer of human capital through her efforts, that together with school investments shape her intellectual development. Schools are not allowed to substitute students at will and it is moreover costly for the student to change school. The manager's intermediary role concerns on the other hand primarily his judgment on the nature of the organization and how it should be operated. His actions determine the survival of the organization he is employed by and it is therefore his personal values on these matters that will be subject to pressure from the economic constraints, being different may ultimately become a contradiction within the system.

REFERENCES

Besley T. and Ghatak M., (2005), "Competition and Incentives with Motivated Agents", *American Economic Review*, 95: 616–36

Binmore, K., (1990), "Nash Equilibrium" in *Essays on the Foundations of Game Theory*, Basil Blackwell Ltd, Oxford.

DiMaggio, P. J. and Powell, W., (1983), "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields", *American Sociological Review*, 48: 147–60

Grossman, S. and Hart, O., (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration", *Journal of Political Economy*, 94: 691-719

Glaeser, E. and Shleifer A., (2001), ''Not-for-Profit Entrepreneurs'', *Journal of Public Economics*, 81: 99–115

Prendergast, C. (2007), ''The Motivation and Bias of Bureaucrats'', *American Economic Review*, 97: 180–96

Shleifer, A., (1998), "State versus Private Ownership", *Journal of Economics Perspectives*, 12: 133-150

Value Oriented Organizations with Value Neutral Hierarchies

Manuel Echeverría

This paper gives a game-theoretical treatment of the institutional homogenization of value-oriented firms. It explains why intrinsically motivated, value-oriented firms like non-profits may become similar to for-profit firms in terms of organization and norms. It highlights and explains the pairs: value-oriented and flat organizations in contrast to value-neutral managers and hierarchical organizations. We consider a major donor like the government who delegates a project to an organization without endowments under asymmetric information. The non-profit is able to adapt its organization by establishing a hierarchy with an intrinsically motivated manager. The donor can in turn react by employing institutions in order to cope with information asymmetries regarding the mission of the organization and the unverifiable values of the manager. Two main cases are examined, one without competition and a competitive case. The equilibrium in the first case is a flat organization or alternatively highly altruistic hierarchy. The second competitive case is characterized by a value neutral hierarchy.

1 INTRODUCTION

The main concern of this paper is to give a theoretical explanation to why non-profit organizations are similar to for-profits in important aspects even though they have very different foundations. This paper contributes to the contemporary discussion on the role of values and norms in economic organizations detailed under *Related Literature* and relates to the sociological strand of research concerned with institutional homogenization, represented among others by DiMaggio and Powel and Powell (1983) and Anheier (2000) who treats the specific case of non-profits. Because ethics and values are commonly thought to be a salient feature of non-profits, our undertaking requires a description of the role of these values as a part of the economic system. The ambition is to provide a formal model with assumptions rooted in economic theory and experiments, without overlooking tractability and clear implications.

Several papers have treated the problem of how the non-distribution constraint can address issues regarding quality and cost savings detrimental to the aims of the donor[1], this constraint prohibits the distribution of profits among different stakeholders; the surplus generated by the organization must be reinvested in production. Our view is that the non-distribution constraint can mitigate these problems but that the delivery of more complex services combined with intrinsically motivated workers will create inefficiencies of another character. A common way of conceptualizing the role of softer, non-monetary incentives and their connection to labour productivity is the summarizing term *intrinsic motivation*. Workers with the opportunity to choose meaningful goals are commonly more motivated (Locke 1991). The vision, purpose and core values of a nonprofit firm are for example expressed in the mission of the organization which is thought to reflect what motivates the staff. The link between mission, motivation and productivity is a recurrent theme in the literature regarding non-profits (see for example Anheier, 2000, 2005; Glaeser, 2001 or Besley and Ghatak, 2005).[2]

Intrinsic motivation can also give rise to practices that deviate from the mission of the donor due to conflicting views regarding the preferred work process and the orientation of the organization and these are matters which are not easily ensured by the accounting identities of the non-profit firm. It is therefore reasonable to believe that other safeguards are needed to ensure that the outcome of the bargain is respected in these cases. We emphasize the workings of both conscious acts and market forces in the shaping of economic institutions i.e. we pronounce a certain combination in the broader concept of governance, for reference see for example Williamson (1985, 2002). Our take is to contemplate the specific role of hierarchy in relation to motivation and the agenda of the firm.

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[1] The work of Glaeser and Shleifer (2001) is an example in economics which follows the tradition of Hansmann (1980) who accentuated the important role of the non-distribution constraint as a signal of commitment to quality towards donors and customers.

[2] This organizational form is therefore a natural subject of study in this paper even though the implications can arguably be extended to other organizations protected by a limited liability constraint, i.e. in situations where direct financial punishment from the donor is ruled out by law.

In order to exemplify the model, consider a major provider of funds, like a state or a major foundation that we from now on call the *donor*. The donor has a specific agenda and is interested in embarking a research project. In order to carry out the project, the donor is faced with one or several organizations with intrinsically motivated employees involved in a non-standardized work process. These workers constitute the *organization* and are in our example researchers who depend on financial support from the donor. The administration and orientation of the organization can be delegated to a *manager* in charge of how the donation is used. With some reservations, think of a university professor. The relationship between the organization and the manager constitutes a key unit which we refer to as *the firm* in accordance with Laffont (2001) and is in our current example a university.

It is reasonable to assume that each individual worker has a more central role in the context of a non-standardized and human capital intensive work process. The donor is faced with a situation characterized by incomplete information about the intrinsically motivated organization's exact inclination regarding the project. The intrinsic motivation of the organization can be valuable for the donor in terms of productivity, but the non-material character of intrinsic motives presents at the same time new challenges and frictions for the management. The organization has superior information about how the project is run and the service itself is complex, which creates additional uncertainties about its success even if the organization exerts an honest effort in line with the aims of the donor. In the university, the success of a research project is subject to many uncertainties and one of the main frictions can be how the organization reacts to the research orientation or agenda. The research questions, methods used and ethical aspects of the research can affect the motivation of the researchers and give rise to conflicts of interest.

The donor's first problem is then to structure a contract in a way that makes the organization want to advance the mission of the donor in the best possible manner. The information asymmetries forces the donor to give up information rents to the organization, something he seeks to minimize by demanding reports from the firm's management which confirm that the agenda of the donor is pursued efficiently. The donor delegates the operation of the firm to the manager, but we simultaneously assume that the donor can check the accounting and compute the optimization at low cost to check that expenditures are reasonable. The rationale for the manager considered here stems instead from the simple idea that it is easier to bargain with one person at a key position rather than with value oriented workers in order to ensure the proper orientation of the firm, in conjunction with the manager's ability to understand and provide verifiable information of the organization's orientation.

The preferences of the manager over the organization's own agenda are therefore important because a value oriented manager would be inclined to let the intrinsically motivated organization keep its information rents in order to enable it to pursue its agenda. These preferences could be made observable but are not possible to contract on. Value oriented organizations will only have internal considerations in mind in absence of competition, if they are endowed or are sufficiently small. In these cases the organizations can afford to be idealistic and non-hierarchical or have value oriented managers. In either case, the donor will in effect be faced with a situation of full asymmetric information regarding its orientation. If

organizations are forced to compete for the contracts, then they will comply with the demands of establishing a hierarchy.

If the economic value of the information rents is sufficiently high, i.e. the firms are important enough, the donor will have incentives to adopt a screening institution in order to make the managers' type observable. Once the institution is in place, competition will make the culture of the firm subject to external considerations and phenomena generated by strategic interaction within and between similar firms and the equilibrium outcome is a value oriented organization with value neutral managers in conjunction with a screening institution which we may associate with the board.

1.1 RELATED LITERATURE AND CONTRIBUTION

The argument in this paper begins with the relationship between the donor and the organization. This relationship is characterized by an adverse selection problem regarding the mission type of the organization and by a moral hazard problem regarding effort exertion, we describe it in *section 2* with a mixed model by Laffont and Martimort (2002). We introduce a manager in *section 3* by combining the model presented in *section 2* with a political economy model of the politician's intermediary role by Laffont (1999, 2001), this modification ads more realism and the implications are used in the last part of the argument regarding institutional change in *section 4*.

The main difference between our work and that of previous contributions is the rather comprehensive approach to preference formation. We link the governance structure to the preferences of management and workforce, i.e. we study the interaction between the manager's values and the institutional configuration of the non-profit firm.

Our argument therefore mainly draws upon the economic literature regarding the influence of intrinsic motivation on the productivity of the firm, and literature which compares firms of different types e.g. profit and nonprofits, public and private firms.

The contribution of Besley and Ghatak (2005) is a prominent representation of the literature which treats the link between motivation and productivity; they analyze the effect of mission alignment between the principal and motivated agents. The main point advanced by these authors is that shared values between the principal and the agent regarding the mission may be achieved and in turn enhance productivity. In contrast to their matching argument, we assume that there is a fundamental conflict between the donor and the firm which triggers responses from the organizations, manager and the donor to gain advantage under asymmetric information and where donor or firm might have weak outside options. Van den Steen (2010) provides a contribution which is parallel to the work of Besley and Ghatak but the author also argues that success can give rise to shared values, which in a sense reverses the causation between productivity and mission alignment. The idea that intrinsic motives can be detrimental and hence disadvantageous for the principal is made explicit by Dixit (2005) who models the misalignment of mission between the principal and the agent as an unwanted byproduct. Prendergast (2007) examines the preferences of "street level bureaucrats". His contribution is to highlight the existence and role of bureaucrats with preferences in favor or

against the client trough a self selection argument. We argue on the other hand that the preferences and organizational structures become more similar to each other under certain conditions.

Other contributions related to motivation and productivity are given by Alesiana and Tabellini (2007, 2008) who explore career concerns and contrast the archetypes of the politician and the bureaucrat by examining the suitability of their objective functions regarding different tasks. Akerlof and Kranton (2005) link intrinsic motivation to group identities and analyze how it affects payment schemes. The main difference with our approach and the literature reviewed so far is that we endogenize the objective function of the decision maker. In the spirit of Canton (2005) we consider organizations with agents whose disposition to act in accordance to intrinsic motives is affected by the incentive structure, intrinsic motives are made endogenous in this way. In contrast to Canton (2005) who studies motivational crowding out in the workforce, we study how the preferences of the management in part are determined within the firm by different market environments.

We relate to the literature which compares different types of firms because the view adopted in this paper is that there are limitations to the non-distribution constraint from the perspective of the donor and that the value-neutral hierarchy will act as a safeguard of the mission once the necessary governance structure is in place. Glaeser and Shleifer (2001) undertake a comparative analysis of the non-profit and for-profit firm in line with Hansmann (1980) and pin down conditions when the organizational features of the non-profit are advantageous to a rational entrepreneur. Corneo and Rob (2003) compare public and private firms in terms of the power of incentives and the allocation of effort between a private and socially valuable task in a way similar to Canton (2005).

A contribution somewhere in between the literature we described so far, is the one of Delfgaauw and Dur (2010) who studies the impact of public service motivation on the distribution of talent in the public and private sector. Besley and Ghatak (2010) study how mission alignment can be achieved when motivated entrepreneurs are in charge of the decisions of the firm. Our study is in the same vein but our focus is not the interaction of motivation and strength of incentives, but rather the interaction between altruism and the organizational form. Our outcome is not only a relation between altruism and payments, it is a particular institutional, and in a sense made explicit below, cultural configuration which is a Nash-equilibrium response to different market environments.

This paper also contributes by establishing a solid correspondence to a subset of concepts and conjectures presented by DiMaggio and Powel (1984) regarding institutional and cultural adaptation discussed in *section 4*.

2 A Mixed Model
The starting point of our argument is the mixed model from *Laffont and Martimort (2002) Ch. 7.11*.

A research project is from a production side perspective a risky undertaking, in the university example from the introduction, the product could in terms of quantity be the number of papers produced; these papers could in turn be of varying quality depending on how much work is put in accordance with the donor's agenda.

Effort exertion can increase the probability of producing a satisfactory amount of papers but other exogenously given factors could affect the outcome as well. Assume that the organization can exert costly effort $e \in \{0,1\}$ to improve the quantity; the quantity can be of two levels, either it meets the standards and is regarded as satisfactory (denoted S) or it fails to meet the standards (denoted F). These states are realized with probabilities $\pi(e)$ and $1 - \pi(e)$, which we denote as π_e and $1 - \pi_e$ where $\pi_1 > \pi_0$ because effort exertion improves the probability of success. A dissertation must for example contain a certain number of papers and this number is more or less determined by convention, effort increases the probability of a satisfactory quantity. The *cost of effort exertion* is $K(e)$ with $K(0) = 0$ and $K(1) = K$.

The donor values quantity and quality and is more content if the number of papers meets the standards, but will still value fewer papers, especially if it is in line with his aims and therefore regarded as high quality work. Quality is a subjective attribute of the project which is valued by the donor and therefore is expressed in his utility function, research quality is denoted as $q \geq 0$ and we denote the value of quality when standards are met as $V_S(q)$ and the unsuccessful outcome as $V_F(q)$. Furthermore $V'(\cdot) > 0$, $V''(\cdot) < 0$ i.e. utility of the donor is increasing in quality but with a decreasing marginal utility. The organization can be more or less efficient in the production of quality (q) depending on whether it is motivated by the project or not.

The researchers are assumed to have intrinsic motives derived from genuine interest in the pursuit of knowledge, the desire of self improvement, purpose, a stimulating work process, and meaningful goals and in some cases even the desire to serve the common good. These aspects of intrinsic motivation are thought to increase the ability of a high quality performance and are related to the cognitive evaluation theory in psychology which states that intrinsic motivation is linked to psychological needs for a sense of autonomy and competence. (Deci et al. 1999, p.628; see also Perry, 2010 on public service motivation) The researchers' propensity to achieve high quality papers is determined by these intrinsic motives *if we abstract from other properties of their ability*.[3]

The organization belongs to the mission set $M = \{\mu_I, \mu_N\}$ where μ_I represents the marginal cost of improving quality for the intrinsically motivated type and the probability of this type is p. The organization which is not intrinsically motivated by the mission is labeled as neutral and is denoted μ_N and we assume that the intrinsically motivated experiences a lower marginal cost: $\mu_N - \mu_I = \Delta\mu > 0$.

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[3] Francois and Vlassopoulos (2008) cite Fehr and Schmidt (2006) who argue that there is a strong support for motivation stemming from preferences other than monetary rewards.

The donor's aim is to ensure an efficient use of the resources and will therefore structure a contract which induces a high level of effort exertion and also takes into account the productivity of the researchers. The donor is to begin with ignorant about the motivation type he is facing (he only knows the distribution) and will try to make the best possible use of the workforce by structuring contracts which specify quality levels the organization must commit to. The quality part of the contract is denoted $q(\tilde{\mu})$ because it is based on the reported type of the organization which he is uncertain of and is therefore denoted $\tilde{\mu}$. The donor is also unable to observe effort and is therefore forced to run the project by making payments $g_S(\tilde{\mu})$ and $g_F(\tilde{\mu})$ based on the observed outcomes of the quantity (Standard or Fail) and the reported motivation type of the organization in order to ensure a high level of effort exertion. The donor will structure a menu $\{g_S(\tilde{\mu}), g_F(\tilde{\mu}), q(\tilde{\mu})\}_{\mu \in M}$ based on the report of the organization's type and the realized quantity of the good in such a way that it makes the best use of the resources given the available information. The organization is risk neutral and subject to a limited liability constraint.

The donor must take into account several restrictions for the two organization types $i = I, N$:

(1) The adverse selection constraints

$$U_i = \pi_1 g_{iS} + (1 - \pi_1)g_{iF} - \mu_i q_i - K$$
$$\geq \text{argmax } e \in \{0,1\}\{\pi(e)g_{jS} + (1 - \pi(e))g_{jF} - \mu_i q_j - K(e)\}$$

$i \neq j, i, j \in \{I, N\}$.

must be respected in order to ensure that the intrinsically motivated organization commits to the work which is considered as more valuable by the donor. Some researchers will tend to feel that the contract with pre-specified qualitative requirements coupled with the research grants constrain their personal aims while others will be incentivized by the research program, the highly motivated staff will have strong incentives to avoid a precise extraction of their hard work by claiming that the project is more demanding and less pleasant than they actually think. If the donor didn't take this restriction into account, then these highly motivated workers could then commit to less demanding research and gain transfers that more than compensate their low production costs due to intrinsic motivation and consequently achieve a greater utility level.

The moral hazard constraints are expressed as

(2)

$$\pi_1 g_{iS} + (1 - \pi_1)g_{iF} - K \geq \pi_0 g_{iS} + (1 - \pi_0)g_{iF}$$

With the participation constraints, the utility U_i of the two types must be greater than zero.

(3)

$$U_i \geq 0$$

Moreover, the following limited liability constraints must hold

$$(4)\ u_{iS} = g_{iS} - \mu_i q_i \geq 0$$
$$(5)\ u_{iF} = g_{iF} - \mu_i q_i \geq 0$$

The organization is mainly thought to lack endowments and therefore dependent on donations and is moreover protected by a limited liability constraint and may hence not be punished if it is unable to fully satisfy the donor. For example, even if a PhD student graduates with a thesis that fails to meet the standards, he will not be fined or forced to pay back the grants and these must moreover compensate the production costs of quality.

If we start with the case where the organization's moral hazard constraint binds, then we directly see from (2) that the same transfer differential is given to the organizations. We can then reformulate (1) to

$$(6)\ U_I = u_{IF} + \frac{\pi_0 K}{\Delta\pi} \geq u_{NF} + \Delta\mu q_N + \frac{\pi_0 K}{\Delta\pi} = U_N + \Delta\mu q_N$$
$$(7)\ U_N = u_{NF} + \frac{\pi_0 K}{\Delta\pi} \geq u_{IF} - \Delta\mu q_I + \frac{\pi_0 K}{\Delta\pi} = U_I - \Delta\mu q_I$$

Where $\pi_1 - \pi_0 = \Delta\pi > 0$.

As in the pure cases of asymmetric information, the relevant restrictions are the incentive compatibility constraint of the motivated organization, and the limited liability restriction of the neutral organization. We can rewrite the expected transfers to the organizations in terms of utility and cost of production and effort and we arrive at the expressions (See Laffont and Martimort (2002)):

$$(8)\ \pi_1 g_{IS} + (1 - \pi_1)g_{IF} = U_I + \mu_I q_I + K \text{ and } \pi_1 g_{NS} + (1 - \pi_1)g_{NF} = U_N + \mu_N q_N + K$$

The donor's problem now becomes

(9)

$$\max_{\{(q_I, u_{IF}), (q_N, u_{NF})\}} p\left(\pi_1 V_S(q_I) + (1 - \pi_1)V_F(q_I) - \mu_I q_I - u_{IF} - \frac{\pi_0 K}{\Delta\pi} - K\right)$$

$$+(1 - p)\left(\pi_1 V_S(q_N) + (1 - \pi_1)V_F(q_N) - \mu_N q_N - u_{NF} - \frac{\pi_0 K}{\Delta\pi} - K\right)$$

s. t. $u_{IF} - u_{NF} \geq \Delta\mu q_N$ (The motivated organization's incentive constraint)

$u_{NF} \geq 0$ (The neutral organization's limited liability)

The optimization yields: $u_{IF} = \Delta\mu q_N + u_{NF}$ and $u_{NF} = 0$ with the results:

$$(10)\qquad U_N = \frac{\pi_0 K}{\Delta\pi}$$
$$(11)\qquad U_I = \frac{\pi_0 K}{\Delta\pi} + \Delta\mu q_N$$

The motivated organization gets an information rent to ensure the desirable research quality and a rent to induce a high effort level in order to increase the probability of a satisfactory level of production (eq. 11). In the context of a nonprofit with a non-distribution constraint, these rents could be used to projects in line with the aims of the organization. The neutral organization gets only a rent to ensure effort exertion (eq. 10). This shows that an adverse selection problem followed by a moral hazard problem adds the information rents from the pure cases.

The nature of the incentives given to the organization are in need of discussion in the light of the empirical and theoretical literature concerned with adverse effects of monetary rewards on intrinsic motivation, i.e. motivational crowding out. Rewards can for example be perceived as controlling or as negative feedback and hence undermine the sources of intrinsic motivation which are autonomy and a sense of competence according to the cognitive evaluation theory. (Deci et al. 1999, p.628)   Evidence suggests that motivational crowding out is not a general result and that tangible rewards can have a positive effect when directly related to the achievement of standards and success.[4] (Cameron et al., 2001, p.23)

The moral hazard rent $\frac{\pi_0 K}{\Delta \pi}$ can be associated with monetary compensation (extrinsic reward) for successfully meeting basic standards, whereas the adverse selection rent $\Delta \mu q_N$ are grants connected to the intrinsic motivation of the researchers and given for exceeding the standards with work in line with the aims of the donor. This latter rent is moreover assumed to be reinvested in projects in line with the researchers' aims due to the non-distribution constraint and can therefore be associated with academic freedom.

The optimal quantity for the motivated type is given by the expression:

(12) $\pi_1 V_S'(q_I^*) + (1 - \pi_1)V_F'(q_I^*) = \mu_I$

We notice that this is indeed the first best but modified to take into account that the surplus is random. The expression for the neutral type is also analogous to the pure adverse selection case, modified for the random surplus case at hand:

(13) $\pi_1 V_S'(q_N^{SB}) + (1 - \pi_1)V_F'(q_N^{SB}) = \mu_N + \frac{p}{1-p}\Delta\mu$

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[4] The results from two meta-studies reveal that the adverse effects of rewards on intrinsic motivation are quite intricate but with distinct features relevant to our approach. One study found that tangible task-contingent rewards (e.g. completion and performance contingent) do mitigate intrinsic motivation whereas verbal rewards have a positive effect. (Deci et al., 1999 p.646-649) Cameron et al. (2001) found no evidence for an overall negative effect of reward. By dividing experiments along the dimensions uninteresting and interesting task, they show that rewards have a positive effect on intrinsic motivation for uninteresting tasks. The negative effect on intrinsic motivation over interesting tasks is only found in certain cases, tangible rewards have negligible or positive effect on intrinsic motivation when given for meeting or surpassing a target or performing better than others. Verbal rewards are associated with positive effects. (Cameron et al., 2001, p.21-23) The cognitive evaluation theory can still be consistent with these results because rewards can promote the sense of competence, autonomy and encourage interest in the task if carefully managed. (Ibid., p. 26)

Which means that the second best production is distorted downwards below the first best level q_N^* given by:

$$(14) \qquad \pi_1 V_S^{'}(q_N^*) + (1 - \pi_1)V_F^{'}(q_N^*) = \mu_N$$

In the university context, it seems that all the researchers must be given a moral hazard rent to ensure a high effort exertion in order to increase the probability of a completed dissertation. The highly motivated researchers must moreover be given an incentive to commit to the more demanding research projects and the projects of the less motivated researchers are at the same time made less demanding in order to decrease the transfers to the inspired researchers.

3 THE MANAGER

This section combines the model of section 2 (Laffont and Martimort 2002) with Laffont (1999 or 2001) and additional extensions are made in section 3.2. regarding the manager's preferences.

Without a manager who is able to observe the type of the organization, the donor would always be forced to give up the full asymmetric information rent due to the elusive nature of the mission and intrinsic motivation of the organization. The monitoring role of the manager is connected to the human resource aspect of the management which is accompanied by his duty to give correct monetary incentives in order to maximize profits.

When structuring payments to the staff of the organization, he is like the donor, unable to observe effort. He is employed by the donor to solve this problem but any other conceivable manager would do as well in this regard. What makes this manager valuable is his ability to observe and provide hard information on the motivation type of the organization when the organization is indeed highly motivated. He is able to make this observation with positive probability. We assume that the manager's probability of detection is common knowledge and the ground for this assumption is that it can be seen as a measure of managerial ability. In a competitive manager labour market, it is reasonable to assume that the spread is sufficiently close to this competitive value. There is evidence that managers do differ in important regards and moreover make different choices in similar situations as Bertrand and Schoar (2003) argue, two things that seem to go against our assumptions and conclusions. Clearly, if managers are allowed differ in the ability to compute the optimization problem, manage the accounts or differed in any other way, then we would in effect be assuming additional noise in these dimensions, something which for example could be modeled by multidimensional asymmetric information regarding skill and ethics. Such modification could then be made consistent with the observation that managers in similar situations act differently regarding for example investments. We abstract from these issues in order to be able to discuss the preferences of the managers over the mission of the organization in isolation.

The manager maximizes the objective function of the donor when solving the problem of asymmetric information. He has no informational advantage vis-à-vis the donor in the moral hazard problem with unobservable effort and is not able to deviate from the second best in an

opportunistic manner. In short, manager and donor have the same incomplete information regarding effort exertion.

Asymmetric information between the donor and the manager only emerges when the manager discovers the organization's type; he is then at a valuable informational advantage. The informed manager will in this case make a take-it-or-leave-it-offer to the organization and he is willing to conceal the signal on the motivational type of the organization in exchange for a share of the information rent. It is in the interest of the organization to keep its agenda private to attain an information rent from the donor. The manager is put into a clear cut test where his intrinsic motivation and preferences for the mission of the organization will be balanced against his desire for monetary gains or extrinsic motivation. If he is altruistic enough, he will let the organization keep the information rent which is assumed to be used to advance the agenda of the organization's staff due to the non-distribution constraint. The bargaining between the manager and the organization resembles an ultimatum game where the manager has the advantage and could acquire most of the information rent. The only thing that could stop him from doing this is his own preferences and the level of worker resistance that generates transaction costs[5]. It is the donor who is endowed with resources and will in the end make a transfer to the organization after the manager's recommendation. The compensation must cover the manager's outside option and encourage an objective evaluation and report of the organization's mission type.

We could for example perceive the manager in the university as a professor in charge of the research and the workers as the PhD students. Time is money; the stake of the bargain is ultimately how the research fund is going to be used. The information rent is the time the productive student will have left to spend as he wants after fulfilling his contract. The bargain is then about if the research will be in line with the preferences of the student or the professor. This bargain is thought to be subject to transaction costs which mainly depend on the relative *toughness* of the two parties.

The manager receives a signal σ which is informative with a positive probability when the type of the organization is in accordance to the one of the donor, i.e. when $\mu = \mu_I$ and the organization is as a consequence also highly motivated. This probability is denoted $\Pr(\sigma = \mu_I | \mu = \mu_I) = \varepsilon$. The manager might in this case fail to see that the organization is highly motivated and provide verifiable proof of its type. This happens with probability $\Pr(\sigma = \phi | \mu = \mu_I) = 1 - \varepsilon$, where $\sigma = \phi$ is the uninformative signal.

Note that

$\Pr(\sigma = \mu_I) = \Pr(\sigma = \mu_I | \theta = \mu_I)\Pr(\mu = \mu_I) + \Pr(\sigma = \mu_I | \mu = \mu_N)\Pr(\mu = \mu_N) = \varepsilon p$ because $\sigma \neq \mu_I$ when $\mu = \mu_N$, i.e. the manager is unable to observe and provide hard, verifiable evidence when the organization does not have a mission in accordance with the donor's. In

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[5] The donor can be thought to face long run players who conform to a certain level of rent-sharing that is captured by an exogenous transaction cost parameter (see Laffont 2001). Forsythe et al. (1994) found that considerable part of the subjects offered at least the equal split in ultimatum games.

the same manner, we see that $\Pr(\sigma = \phi) = 1 - p\varepsilon$ by computing the complement or using the law of total probability.

The reader might ask himself why a manager from the organization would not be able know the type of the organization automatically. The answer is that the manager still has to receive a signal with hard information to be able to report. The power of the manager in terms of his screening ability, i.e. his capacity to discover the type of the organization, becomes moreover less of a "deus ex machina" if we think of him coming from the organization itself.

After the manager receives his signal, he has the choice to report what he observes or conceal his informative signal in the event he has succeeded to acquire verifiable proof of the mission type of the organization, i.e. his action space in terms of reports is $r \in \{\mu_I, \phi\}$. The manager is in charge of production but he will still be forced to report to the donor to motivate his payment scheme to the organization, this information is verifiable.

3.1 THE PREFERENCES OF THE MANAGER AND HIS COMPENSATION

If we abstract from the costs of managing in terms of effort i.e. it is costless to conduct the optimization problem, then the rationale for the monetary compensation to the manager i.e. his wage, can't be effort exertion and must therefore have another root. The manager is compensated for his outside option. But as we will see, the basis for the manager's wage is the information rent of the organization, in conjunction with the manager's informational advantage vis-à-vis the donor, his upper hand in the bargaining with the organization and his preferences for the mission of the organization.

We proceed by taking a step back and consider a benchmark case where the manager is reduced to a pure screening device at the disposal of the donor without own preferences. In this case, the donor is able to use the manager to detect the type of the organization with certain probability and will consequently be able to improve his expected utility because of his improved informational capacity. The delegation to this truth telling manager is costless; he will unconditionally give a truthful report even in the occasion when he is in an informational advantage, i.e. he will always report $r = \sigma$. In other words, the collusion game is never played. A bargain between the organization and the manager is never realized. The only compensation necessary is a fixed wage (w) that covers the manager's outside option which is the same for the manager without the ability to detect the organization's type.

If the signal is uninformative, then the manager must form beliefs about which type the organization is according to Bayes rule.

$$\Pr(\mu = \mu_I | \sigma = \phi) = \frac{\Pr(\mu = \mu_I \cap \sigma = \phi)}{\Pr(\sigma = \phi)} = \frac{\Pr(\sigma = \phi | \mu = \mu_I)\Pr(\mu = \mu_I)}{\Pr(\sigma = \phi)} = \frac{(1 - \varepsilon)p}{1 - p\varepsilon} = \hat{p}$$

Where $\hat{p} < p$ and the denominator is

$$\Pr(\sigma = \phi) = \Pr(\sigma = \phi | \mu = \mu_I)\Pr(\mu = \mu_I) + \Pr(\sigma = \phi | \mu = \mu_N)\Pr(\mu = \mu_N) =$$

$$= (1 - \varepsilon)p + 1(1 - p) = 1 - p\varepsilon.$$

When the manager detects the type of the organization, then his problem is reduced to a pure moral hazard problem with limited liability. He may in this case achieve the first best (FB) quantity q_I^* because he knows the type of the organization and will in addition not give up any adverse selection rents in this event. In doing so he is able to fully extract the productive capacity from the motivated organization without giving up information rents and will not make other payment than the one necessary to induce a positive effort level under limited liability. The manager will then with probability $v\varepsilon$ know that $\mu = \mu_I$ and because of the truthful report, the donor receives the expected payoff

$$(15) \qquad p\varepsilon\left(\pi_1 V_S(q_I^*) + (1-\pi_1)V_F(q_I^*) - \mu_I q_I^* - \frac{\pi_1 K}{\Delta\pi} - w\right) = p\varepsilon(W^{FB} - w)$$

Because the payments are $\mu_I q_I^*$ to cover the cost of production and because the solution to the problem with moral hazard under limited liability with zero assets to the organization is a transfer of the magnitude $\frac{\pi_0 K}{\Delta\pi}$ and the cost of effort is K.

With probability $1 - p\varepsilon$ the signal is useless and the donor must form expectations of the probabilities of $\mu \in \{\mu_I, \mu_N\}$. The donor is in this informational state forced to solve the mixed problem with adverse selection followed by moral hazard. The quantities are given by the first order conditions similar to the mixed case above but now computed with the probability $\hat{p}$.

$$(16) \qquad \pi_1 V_S'(q_I^*) + (1-\pi_1)V_F'(q_I^*) = \mu_I$$

The second best quality level with a manager (SBM) for the neutral organization is on the other hand higher than the case without a manager. The nature of the tasks carried out by the two types can be allowed to be more similar compared to the case without a manager

$$(17) \qquad \pi_1 V_S'\left(q_N^{SBM}\right) + (1-\pi_1)V_F'\left(q_N^{SBM}\right) = \mu_N + \frac{p}{1-p}(1-\varepsilon)\Delta\mu$$

The expected payoff is expressed as:

$$(18)$$

$$(1-p\varepsilon)\left[\hat{p}\left(\pi_1 V_S(q_I^*) + (1-\pi_1)V_F(q_I^*) - \mu_I q_I^* - \left(\Delta\mu q_N^{SBM} + \frac{\pi_1 K}{\Delta\pi}\right)\right)\right.$$

$$\left. + (1-\hat{p})\left(\pi_1 V_S\left(q_N^{SBM}\right) + (1-\pi_1)V_F\left(q_N^{SBM}\right) - \mu_N q_N^{SBM} - \frac{\pi_1 K}{\Delta\pi}\right) - w\right]$$

$$= (1-p\varepsilon)(W^{SBM} - w)$$

The expected payoff can therefore be written as

$$(19) \qquad v\varepsilon W^{FB} + (1-v\varepsilon)W^{SBM} - w\,.$$

3.2 THE SELF INTERESTED AND INTRINSICALLY MOTIVATED MANAGER

The interaction between the donor, manager and organizations can be described by a game with eight time periods and is solved recursively by starting from the last period. The game as a whole is dependent on the assumption that organization and managers know their type. The management of the firm sympathizes with the agenda of the motivated organization to a certain degree; a manager's type corresponds to his altruism $\Psi \in [\alpha, \omega]$ towards the organization, which measures the extent of his internalization of the organization's mission. The actors will adapt their institutions and values at the beginning of the game (t=1) in order to improve their positions, this stage is described in *section 4*. The game ends when the contract is fulfilled, at this stage (t=7) the firm receives its transfers from the donor in exchange for its services.

The timing of the game is:

t = 0: Organization learns μ and manager learns Ψ (players learn their own type)

t = 1: Institutional adaptation (Institutional reaction and competition between organizations resolved)

t = 2: Donor offers contract to manager and manager offers the official contract to the organization

t = 3: Organization and manager learn σ (signal received)

t = 4: Organization and manager accept or reject official contracts

t = 5: Organization exerts effort and chooses output

t = 6: Manager offers the organization a side contract

(Manager offers a manipulation of reports if self interested)

t = 7: Quantity is realized and transfers take place

If we go beyond the benchmark case and consider an intrinsically motivated manager concerned with how the organization's information rent is allocated (measured by Ψ) in addition to monetary rewards, then the delegation to the manager is no longer costless. After the manager observes an informative signal (t=3), which was described in the previous section, he will offer the organization a side contract that involves the concealment of the signal from the donor in exchange for a transfer from the organization. This sub-game (t=6) is realized with probability $\Pr(\sigma = \mu_I) = p\varepsilon$ and constitutes the value oriented firm and will be described in detail in this section.

The transfer from this sub-game, which can only occur with an intrinsically motivated organization, is realized when the contracts are executed. The information that the manager has on the organization's mission type is valuable to the manager because he realizes that the organization is willing to give up a share of the information rent in order to hinder him from reporting to the donor. The side contract is the result of a bargain associated with transaction costs; these costs imply that the payoff will be lower than the total rent at stake.

The side contract offered by the manager involves communication in a bargain over the information rent and is binding. We assume that the bargain is subject to transactions costs which are common knowledge and treated as fixed. We derived the information rents in *section 2* and know that the motivated type gets $\Delta\mu q_N + \frac{\pi_0 K}{\Delta\pi}$ without a manager, but it is with our assumptions only the rent $\Delta\mu q_N$ associated with adverse selection that can be claimed by the manager because he has no informational advantage vis-à-vis the donor in the moral hazard problem with unobservable effort. As a consequence, he is forced to give up an information rent of the magnitude $\frac{\pi_0 K}{\Delta\pi}$ to incentivize the organization optimally and this rent cannot be subject of the bargain.

There will be interplay between the transaction costs and the managerial altruism that interfere with the result of the bargain in the firm. We assume that the manager cares for monetary rewards and can in addition have preferences for the mission of the organization. We make the plausible statement that the preferences for the mission are expressed in how he values the amount of the information rent kept by the firm which as previously commented, allows a clean test of the managerial altruism. We denote the rent the manager chooses to claim in the bargain as x_1 and x_2 the amount he leaves to the organization. We denote the level of managerial altruism as $\Psi_i \in [\alpha, \omega], \alpha \in (0,1), \omega > 1$ and let $T \in (0,1)$ be a measure of the severity of transaction costs which are assumed to be common knowledge and derived from the conflict of interest in the bargain. A lower value of T is interpreted as a more severe level of transaction costs; each unit of the information rent the manager takes for himself depreciates in proportion to the severity of the transaction costs.

Furthermore, remembering that the bargaining power of the manager is total, the side contract can be described as

$$(20) \qquad \text{Max } Tx_1 + \Psi x_2$$
$$\text{s.t. } x_1 + x_2 \leq \Delta\mu q_N$$

The constraint states that the sum of the allocations must be less than the stake of the game, namely the asymmetric information rent, it obviously binds in optimum. This formulation of the problem emphasizes the tradeoffs, or internal conflict of the manager.

We proceed by recalling that the relationship between the manager and the organization, characterized by the bargain, is the *firm* and that the donor will react to the firm's collusive nature by making a transfer to the manager to mitigate opportunistic behavior. When we abstract from the effort exertion of the manager, we perceive his role in the firm as the one of an outside observer. The two structures presented in the figure are with our assumptions equivalent in the sense that they have the same solution. To the left, the donor carries out the maximization problem with the help of a supervisor and solves the maximization problem; to the right the manager recommends payments to the motivated staff. (see Laffont 1999 and Laffont 2001)

Figure 1

Equivalent Structures
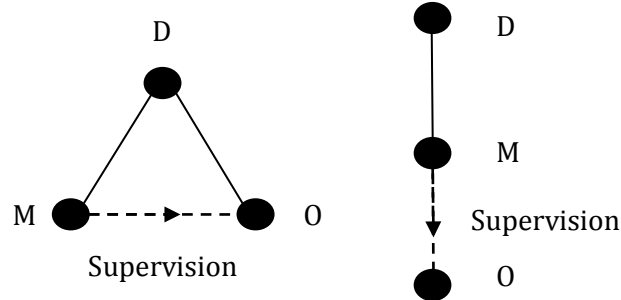
If we denote the payment made to the manager as *b* (representing one of the cases below), we will end up in the following expression for the expected welfare of the donor:

(21)

$$p\varepsilon \left(\pi_1 V_S(q_I^*) + (1 - \pi_1)V_F(q_I^*) - \mu_I q_I^* - \frac{\pi_1 K}{\Delta \pi} - b \right) + (1 - p\varepsilon)W^{SBM'} - w$$
$$= p\varepsilon W^{FB} + (1 - p\varepsilon)W^{SBM'} - (w + p\varepsilon b)$$

Where the last term is the fixed wage and incentive payment to the manager, the latter derived from his advantageous informational position in the case he is able to present verifiable proof of the motivation type of the organization, these incentive payments will therefore be paid out with probability $p\varepsilon$. To simplify the analysis we proceed by normalizing w to zero.

If extrinsic and intrinsic rewards are perfect substitutes, then we have as usual, three main cases characterized by two corner solutions or a range of solutions satisfying the budget restriction. If $\Psi > T$ then the manager is strongly motivated and altruistic to the extent it is optimal for him to let the firm have the information rent without personal gain even though he is assumed to have full bargaining power ($x_1 = 0$ and $x_2 = \Delta \mu q_N$).The manager realizes that the rent he can acquire is subject to transaction costs and becomes due to his altruism, less valuable than the satisfaction he derives from letting the firm keep it.

There are two interesting sub cases. If $\Psi > 1 > T$, then it becomes too expensive for the donor to counteract the manager's altruistic choice because he would then be forced to offer the manager extrinsic rewards greater than the total value of the information rent he is giving up to begin with. In this sub case, avoiding collusive behavior is too expensive and the firm will consequently benefit. If on the other hand $1 > \Psi > T$ is true, then compensation with the power to hinder collusion is incentive feasible ($b = \Psi \Delta \mu q_N$) but more expensive than when the manager is indifferent to the intrinsic rewards of the mission.

The second main case arises when $\Psi = T$ and the manager values an allocation to himself and the firm equally, this balanced manager will agree to any split of the total rent. The donor reacts by making the payment $b = \Psi \Delta \mu q_N = T \Delta \mu q_N$ in order to induce a truthful report.

The other main case resulting in a corner solution arises when $T > \Psi$ and the manager is weakly motivated by the mission. Intrinsic motivation is now relatively low and the rent attained by the manager when he undertakes a costly bargain is worth more to him than an altruistic allocation to the firm. The donor is in this case at a more favorable position because the incentive payment enough to induce a truthful revelation of the firm's type is lower than in the previous case ($b = T\Delta\mu q_N$).

The table below summarizes the firm's bargain and the donor's reactions. The donor will react optimally to the collusion and the contract will be structured as an optimal response to the collusion game. The donor optimizes the expected value by taking into account the incentive payment necessary to ensure collusion proof contract. There are three distinct cases from the donor's cost minimizing perspective: If the manager is highly altruistic ($\Psi \geq 1$), then the donor will be unable to use the manager in a profitable manner. When the intrinsic motivation of the manager is low enough ($\Psi \leq T$), then the donor can avoid collusion with low powered incentives $b = T\Delta\mu q_N$, which are fully determined by the transaction costs. When the altruism of the manager is at a intermediary level $\left(\Psi \in (T, 1)\right)$, then the donor is able to adapt the level of the incentive payment to the level of intrinsic motivation ($b = \Psi\Delta\mu q_N$).

Table 1

Altruism and Transaction Costs	Rent Allocation in the Collusion Game	Optimal Response by Donor
$\Psi \geq 1 > T$	Organization. $x_1 = 0, x_2 = \Delta\mu q_N$	Incentive Payment to manager (b): $b = 0$ -Collusion can't be avoided, too expensive
$1 > \Psi > T$	Organization. $x_1 = 0, x_2 = \Delta\mu q_N$	Incentive Payment to manager (b): $b = A\Delta\mu q_N > T\Delta\mu q_N$
$1 > \Psi = T$	$\forall x_1, x_2$ s.t. $x_1 + x_2 = \Delta\mu q_N$	Incentive Payment to manager (b): $b = T\Delta\mu q_N$
$T > \Psi$	Manager. $x_1 = \Delta\mu q_N, x_2 = 0$	Incentive Payment to manager (b): $b = T\Delta\mu q_N$

Proposition 1

If the manager is properly compensated, then he will be truth telling, i.e. will give a truthful report whenever he discovers the type of the organization. The necessary conditions to achieve this are:

(22) $\quad \pi_1 V_S'(q_I^*) + (1 - \pi_1)V_F'(q_I^*) = \mu_I$

(23) $\quad \pi_1 V_S'(q_N^{SBM'}) + (1 - \pi_1)V_F'(q_N^{SBM'}) = \mu_N + \frac{p}{1-p}(1 - (1 - \Psi)\varepsilon)\Delta\mu$

Which are the first order conditions to problem (21) (see appendix).

Equation (22) states that the quantity of the intrinsically motivated organization is set to the efficient level. Equation (23) shows that the quantity of the unmotivated organization is dependent on the level of the intrinsic motivation of the manager. When the manager's ability is very poor ($\varepsilon = 0$) or his altruism is high ($\Psi = 1$), the solution collapses to the full asymmetric information case. When the altruism is low, the solution is closer to the one with the benevolent manager. To take into account the true nature of the collusion game one must pay attention to how the manager's payoff depends on the choice of Ψ. Note that the donor is forced to structure a higher powered incentive scheme when the manager is highly motivated or altruistic. The expected value of hiring a manager is positive as long as his compensation is lower than the information rents $\Delta\mu q_N$.

4 COMPETITION, HIERARCHY AND THE ETHICS OF NEUTRALITY

Suppose the donor is forced to delegate the project to a certain non-profit because he lacks alternatives and assume that the non-profit is asked to adapt its organization to a hierarchical form with a manager in charge of production. Assume that the non-profit can adapt the managerial altruism in the interval $\Psi \in [\alpha, \omega]$ after its private information is revealed (t = 1), then it will choose a very value oriented manager i.e. $\Psi \geq 1$ because this manager will let the intrinsically motivated organization keep its information rent. Because it is not incentive feasible for the donor to structure a payment to the manager in order to induce truthful reports, the donor will not make that request unless he makes a mistake and will be forced to deal with a value-oriented and flat organization and give up the full asymmetric information rents derived from effort exertion and motivation type of the firm.

In the face of competition, the non-profits will seek to adapt their organizations in order to advance their positions and achieve a contract. In absence of competition an organization is able to choose a manager only with internal considerations in mind and as shown above, if asked to, the choice will be an altruistic manager in order to avoid conflicts of interest and costly bargain within the firm. When similar organizations depend on funding from a single source, they will be forced to compete for the contract consisting of monetary donations in exchange for their product with pre-specified qualities. They must now take external considerations seriously by recognizing strategic interaction. The organizations will try to adapt to the economic environment in order to gain competitive advantage. To distill from other factors, we consider the case of identical organizations which are able to assign a manager in order to maximize utility. [6]

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[6] To understand the plausibility of this scenario it is necessary to give a proper interpretation of the game. A Nash-equilibrium is often thought to be achieved as a result of the strategic interaction of perfectly rational actors. The other way of interpreting the equilibrium is as a result of gradual adaptation by myopic agents to the economic environment represented by the incentive structure of the game. If we apply the latter *evolutive* interpretation to our setting we can perceive the choice of a certain manager type as a convention, tradition or culture adapted to the economic environment rather than as a result of complex calculations (See Binmore, 1990, p.58-66). Binmore (1993) provides evidenced in an

Consider competition in the form of a Bertrand-styled game where firms simultaneously choose a manager of type $\Psi_i \in [\alpha, \omega]$ played after the organizations receive private information about their types, where Ψ_i is a measure of how value oriented the manager of firm i is. We start by restricting our attention to the duopoly case and index two organizations with i and j. The payoff function of the manager in the event of a collusion game with competition is defined by the choices of the competing organizations and the donor's response in terms of an incentive payment and choice of organization. *The donor will choose the organization with the structure that benefits him the most.*

Definition

The particular organization ethics is defined by $A \equiv [\alpha, T]$, $B \equiv (T, \beta)$ *and* $\Gamma \equiv [\beta, \omega]$ *with* $1 \in \Gamma$ *and* $\beta \in (T, 1)$. *The manager cultures are the product of interaction between two or more organizations, i.e. the Cartesians* A^2, B^2 *and* Γ^2 *in the duopoly case.*

Figure 2

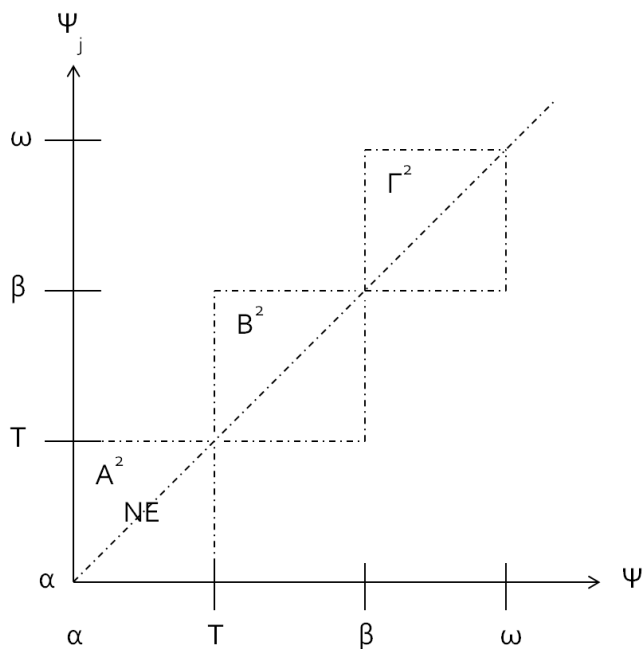**The Cultures**

Figure 2 shows the cultures spanned by the ethics of two similar firms in competition. Each dashed square represents a specific culture which corresponds to particular economic conditions and outcomes in terms of information rent distribution between the actors.

experimental setting that subjects tend to adapt their behavior and norms to the underlying equilibrium of the game.

Proposition 2

The neutral manager is most beneficial to the donor, if we are in the B^2-region, then the donor prefers the one closest to $\Psi = T$, i.e. the "golden mean" manager. Moreover, the upper bound for the region is necessarily less than one. (See appendix)

Using equations (22), (23) and proposition 2, we see that there are three critical intervals for the payoffs of the players; we define A, B and Γ. It is comfortable to denote the payoff of the donor as a function of $\Psi_i \in \Xi, \Xi = \{A \cup B \cup \Gamma\}$, as $D(\Psi_i)$. The intersection of the subsets is obviously empty.

Because the altruism parameter of the manager is an unknown necessary to a rational response from the donor, there will be very strong incentives to create an institution with the ability to screen managers and we are therefore in a position where we can hypothesize the use of such an institution ($t = 1$). Without such institution, the organizations would always report a neutral manager while employing a strongly value oriented one because the nature of this attribute is *unverifiable* and can't be enforced by a court. The economic incentives to use this institution are increasing in the information rents $\Delta\mu q_N$ attributable to the motivation type of the organization. It is rational to build such an institution if the cost, assumed to be proportional to the increased accuracy (probability of successful detection) is such that a high enough expected value can be realized using a cost-benefit principle. If we for sake of simplicity assume that the institution is perfectly accurate in its capacity to make the manager type *observable*, then it is feasible to utilize if the associated cost is *at most*[7]

$$(24) \qquad C = p\varepsilon\Delta\mu q_N^A(1 - T)$$

which is the difference between the mission-related information rent and the expected incentive payment to the neutral manager. This expression is derived by realizing that once the institution is in place, the competition will induce a downward pressure on the mission orientation of managers. The donor will therefore be able to achieve a collusion proof contract and a reliable report. The information revelation leaves the organization without mission related information rents. The mechanism will be described below.

The implication on the donor's payoff due to a change in Ψ is not equal over Ξ. The intervals A and Γ are coarse in the sense that $D(\Psi_i) = D(\Psi_j) \forall \Psi_i, \Psi_j \in A$ and $D(\Psi_i) = D(\Psi_j) \forall \Psi_i$ when $\Psi_j \in \Gamma$. The reason for this can be understood with equation (23) and table 1; when $\Psi = 1$ then the donor faces the equivalent of a full asymmetric information case and higher levels will make the situation worse and undermine the best interest of the donor. Therefore no manager will be employed whenever $\Psi \in \Gamma$. On the other hand when $\Psi_i, \Psi_j \in B$, then the payoff of the manager is sensitive to differences in the altruism parameter. Equation (23) reveals that a lower level of altruism will take the problem closer to the benevolent manager case i.e. $D(\Psi_i) = D(\Psi_j)$ iff $\Psi_i = \Psi_j$ but $D(\Psi_i) > D(\Psi_j)$ if $\Psi_i < \Psi_j$.

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[7] For a more detailed discussion of an *incentive compatible* monitoring institution under the pure moral hazard case, see Tirole (2001) for reference.

In other words, when the strategies are in the subset Γ, then the organizations can only undercut each other by moving to the adjacent subset A or B and when the choices are in the set A, the organizations can at best tie. The donor will use equation (23) when the manager is the B-type. When the manager is the Γ-type, the donor will face the full asymmetric information rent. In the case the manager is the A-type, the donor will recognize the restriction transaction costs put on his opportunistic behavior and utilize this by setting the payment to the lowest level corresponding to $\Psi_i = T$. In this manner we are able to recognize that the donor's preference is $D(A) > D(B) > D(\Gamma)$.

The donor's payoff w.r.t. the choices of manager is then divided in three cases. The first case is when $\Psi_i \in \Gamma$ and it becomes too expensive to hire a motivated manager and the donor is forced to rely on its own resources by conducting an unaided supervision and hence forced to give up the full asymmetric information (FAI) rent. When $\Psi_i \in B$, the manager will set a bonus payment that is proportional to the manager's altruism coefficient and adapt the output levels accordingly to maximize utility.

If Ψ_i is the equilibrium choice, the manager's compensation is

$$(25) \qquad M_i(\cdot) = \begin{cases} \Psi_i \Delta \mu q_N^{FAI} & \text{if } \Psi_i \in \Gamma \\ b_B = \Psi_i v \varepsilon \Delta \mu q_N^B & \text{if } \Psi_i \in B \\ b_A = T v \varepsilon \Delta \mu q_N^A & \text{if } \Psi_i \in A \end{cases}$$

The first entry represents the case when the donor is unable to induce a truthful revelation due to the manager's substantial altruism. The manager will let the organization keep the information rent and his utility is derived from his intrinsic motivation or altruism alone. The second entry is the case when the donor is able to adapt the payments to the level of managerial altruism in accordance to equation (22). In the third entry, the payment is at its lowest level and determined by the transaction costs of the bargain.

As we have seen, the donor's payoff in Ξ is affected by the manager's ethic. We start by denoting the expected payoffs in the different subsets. The Γ^2-payoff is determined by equations (12) and (13):

$$p\left(\pi_1 V_S(q_I^*) + (1-\pi_1)V_F(q_I^*)\right) + (1-p)\left(\pi_1 V_S(q_N^{FAI}) + (1-\pi_1)V_F(q_N^{FAI})\right)$$
$$-\left[p\left(\Delta \mu q_N^{FAI} + \frac{\pi_0 K}{\Delta \pi} + \mu_I q_I^* + K\right) + (1-p)\left(\frac{\pi_0 K}{\Delta \pi} + \mu_N q_N^{FAI} + K\right)\right]$$

We denote this payoff as

$$p\widetilde{V}(q_I^*) + (1-p)\widetilde{V}(q_N^{FAI})$$
$$-\left[p\left(\Delta \mu q_N^{FAI} + \frac{\pi_0 K}{\Delta \pi} + \mu_I q_I^* + K\right) + (1-p)\left(\frac{\pi_0 K}{\Delta \pi} + \mu_N q_N^{FAI} + K\right)\right]$$
$$= V^\Gamma - G^\Gamma$$

The payoff in the B^2-region is determined by equations (21) and (22) and can be written as:

$$p\widetilde{V}(q_I^*) + (1-p)\widetilde{V}(q_N^B) - \left[p\left(\Delta\mu q_N^B + \frac{\pi_0 K}{\Delta\pi} + \mu_I q_I^* + K\right) + (1-p)\left(\frac{\pi_0 K}{\Delta\pi} + \mu_N q_N^B + K\right)\right]$$
$$- p\varepsilon\Delta\mu q_N^B(1-\Psi) = V^B - G^B - b_B$$

In the same manner, the payoff in the A^2-region can be written as

$$V^A - G^A - b_A$$

We can therefore write the donor's payoff function as

$$(26) \qquad D(\cdot) = \begin{cases} V^A - G^A - b_A & \text{if } \Psi_i \in A \\ V^B - G^B - b_B & \text{if } \Psi_i \in B \\ V^\Gamma - G^\Gamma & \text{if } \Psi_i \in \Gamma \end{cases}$$

Assume first that two highly motivated organizations face each other and they have knowledge of each other's types. This information assumption can reflect a scenario when the organizations in the field are connected as for example different research groups within the university. To focus on the competitive aspects we rule out the possibility of collusion between the organizations. This competitive scenario is denoted as $S(\mu_I, \mu_I)$.

Proposition 3

The equilibrium manager culture is characterized by a low degree of benevolence towards the organization which means that the manager can be compensated in order to make him truth telling. The culture restricts the behavior to a range from the ethics of neutrality to the golden mean ethics ($\Psi = T$). (See appendix)

Once the manager competition is resolved and an equilibrium type is employed in the hierarchy, the manager will proceed by structuring the collusion proof contract consisting of the quality dependent transfers, type dependent quantities and the manager receives his bonus payment from the donor in the usual manner. The donor will pick the most lucrative organization. When $D(\Psi_i) = D(\Psi_j)$ the donor will pick a firm with equal probability because he is then indifferent between the two; we assume that $\frac{\pi_0 K}{\Delta\pi} + 2(1-\varepsilon)\Delta\mu q_N^B > \Delta\mu q_N^{FAI}$ and if not that the donor will be forced to be more "picky" and choose O_i if $\Psi_i < \Psi_j$ whenever $\Psi_i, \Psi_j \in \Gamma$ or that he will pick two other organizations whenever $\Psi_i = \Psi_j$ in Γ. The moral hazard rent encourages competition and is especially important in that regard when the probability of detection is high. The equilibrium play of the game is that both organizations choose a manager in A. The first entry in equation (27) states the payoff of the organization when both organizations choose the Γ-type. In this case the donor is forced to give up the full asymmetric information rent to the organization which gains the contract and adapt the quantities to the full asymmetric information state. Because the donor is indifferent between the two organizations, he will give the contract to one of them with equal probability and their expected values are therefore weighted with one half. Because the donor is always able to structure a collusion proof contract when the manager is moderate, the organizations will be left without the motivation based adverse selection rent if the manager acquires verifiable proof of their type. When the organizations are in the B^2-region, then they will have

incentives to deviate downwards in every point in order to undercut the other organization and gain the contract. When the A^2-region is reached, the organizations can at best tie and will conform to any point in the region.

(27)

$$O_i(\cdot) = \begin{cases} \frac{1}{2}\left(\frac{\pi_0 K}{\Delta\pi} + \Delta\mu q_N^{FAI}\right) & \text{if } \Psi_i, \Psi_j \in \Gamma \\ \qquad\qquad 0 \text{ if } \Psi_i \in \Gamma \text{ and } \Psi_j \notin \Gamma \\ \frac{\pi_0 K}{\Delta\pi} + (1-\varepsilon)\Delta\mu q_N^B & \text{if } \Psi_i \in B \text{ and } \Psi_i < \Psi_j \\ \frac{1}{2}\left(\frac{\pi_0 K}{\Delta\pi} + (1-\varepsilon)\Delta\mu q_N^B\right) & \text{if } \Psi_i \in B \text{ and } \Psi_i = \Psi_j \\ \qquad\qquad 0 \text{ if } \Psi_i \in B \text{ and } \Psi_i > \Psi_j \\ \frac{1}{2}\left(\frac{\pi_0 K}{\Delta\pi} + (1-\varepsilon)\Delta\mu q_N^A\right) & \text{if } \Psi_i, \Psi_j \in A \end{cases}$$

Note that the probability weights of one half are the expectations *prior to the official contract*; once the organization has been contracted, it updates its beliefs and will expect to gain the whole moral hazard incentive $\frac{\pi_0 K}{\Delta\pi}$ because the organization anticipates the collusion proof contract.

The other cases are solved analogous to the $S(\mu_I, \mu_I)$ case. When competition is characterized by $S(\mu_N, \mu_N)$, then neither organization will gain anything by choosing a manger who is not the A-type in terms of motivation rents, it is straight forward to show that the equilibrium choice is in the subset A^2. When $S(\mu_I, \mu_N)$ is realized then the Nash equilibrium are also in A^2. The perhaps more interesting main case is when the organizations in the field are unconnected and therefore uninformed of each other's types. This competitive main case is denoted $S(\tilde{\mu}, \tilde{\mu})$ and could in the context of our example be interpreted as competition between different universities. We know it is rational for O_i to play the A-type regardless of the type of O_j and that it is rational for O_j to play the A-type regardless of the type of O_i i.e. it is always rational for each player to play the A-type regardless of which type they think they are competing with. Therefore, the Nash-equilibria will be found in the subset A^2 (see figure 2).[8]

The non-competitive game in *section 3* leads to equilibrium without a manager, if the donor asks the organization to pick one, the most altruistic is chosen. The donor is then forced to give up the full asymmetric information rent to the non-profit organization. When the competition is intensified the organizations will choose the balanced or weakly motivated manager and hence establish a hierarchy in equilibrium. These two scenarios represent a flat

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[8] The other possibility is to define organization i as $O_i(\mu_I, \mu_N)$ and j in the same manner but this will give rise to conflicts of interest within the organization. The motivated type wants the value oriented manager in order to get the mission rent whereas the neutral type is willing to conform with the neutral manager. This situation may give rise to bargaining between the types both with and without competition, this is especially plausible in the former case when the neutral type risks the contract if a value oriented manager is chosen without gaining anything. This bargaining process can be modeled or assumed away for purpose of exposition.

and value oriented organization in contrast to a hierarchical organization with neutral managers.

One illuminating example in Glaeser (2002) is the case of universities in USA. The orientation and many of the matters now considered as natural to be decided by the university where once decided by the donors. The mission of the university, where the most important part is the research agenda, was dictated by the donors when the universities lacked own resources. The bargaining power of the universities increased with their wealth, once wealthy the universities became more research oriented and its top tier administrators where recruited from the ranks of researchers. The research oriented university can thus be seen as a result of its endowments which ensured autonomy and empowered it with the ability to choose its own mission in accordance with the preferences of the researchers.

The case without competition can also be seen as a situation when the organization is endowed. If a manager is required, then the most value-oriented will be chosen. The competitive case corresponds to the phase when the organization lacks own resources and will adapt by establishing a hierarchy with pragmatic managers. Laws that inhibit the accumulation of independent university resources can with this perspective be seen as a way of controlling the research agenda. The screening institution can be given a less literal interpretation and be associated with a human resource department. The increase of human resource programs at the university level could for example be connected to the secular growth of the tertiary production and the new causes of information asymmetries related to the increasing importance of personal attributes of the workforce.

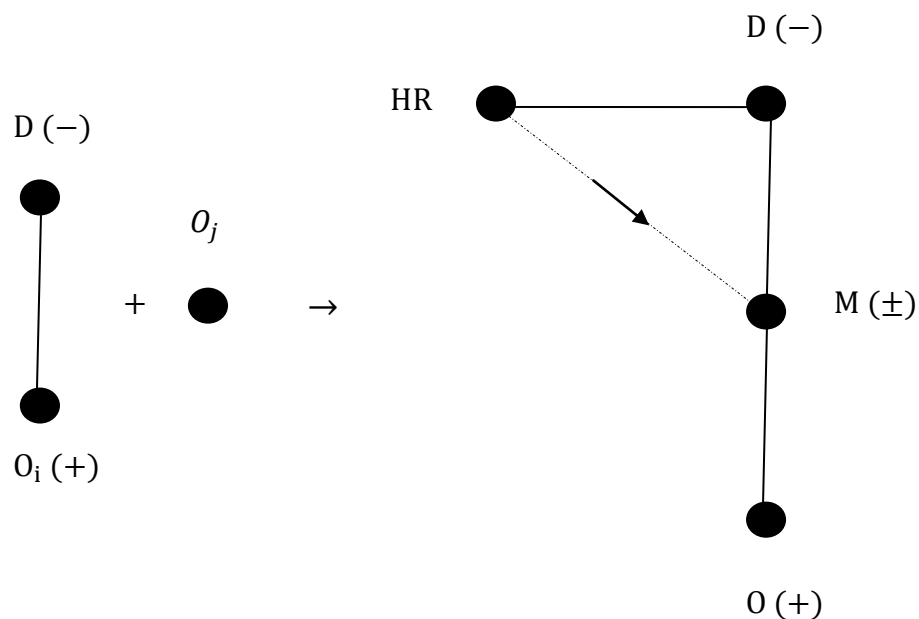**Figure 3**

Institutional Reaction

Figure 3 is meant to give the reader a compact summary of the model by emphasizing the structural features. The leftmost connection represents the case without competition which implies a donor faced with a flat value oriented organization and is forced to give up the full asymmetric information rent. The signs $(+)$ and $(-)$ represent different views regarding the orientation of the mission and where $(\pm)$ represents the intermediary view. If the manager would ask the non-profit to present a manager and establish a hierarchy, because he for example makes a mistake then the organization would inevitably employ the most value oriented manager which would be represented with an intermediary link and the sign $(+)$. The second case involves the whole addition to the left of the arrow which represents competition. Once this case is realized, it triggers a series of reactions from the actors which are represented by the structure to the right of the arrow. If the necessary conditions are met, then the donor reacts to the competition by establishing a screening institution and asks for reports. The organizations respond to the new environment by adapting to the requests from the donor and will establish a hierarchy. The strategic interaction under this competitive regime will ultimately induce a neutrality culture in equilibrium which is denoted by $(\pm)$.

It is certainly in place to relate these findings to the terminology of DiMaggio and Powell (1983). In their language, this paper examines coercive and normative homogenization (isomorphism) in a field of nonprofit organizations providing a complex service with uncertain quality.[9] The uncertainty about the production process and motivation type of the organization, the resource dependence of a single donor and competition are characteristics that DiMaggio and Powell argue will increase the level of isomorphism in a given field.

5 CONCLUSION

The theory explains how the economic interaction between a financer and value-oriented organizations gives rise to an institutional and cultural adaptation. The result of this adaptation constitutes distinct firms which in equilibrium are optimal responses to different economical environments. The theory provides a game theoretical formulation of culture and as we have seen, relates to the sociological literature and pins down the necessary conditions for the realization of the phenomena. These conditions are derived from well established assumptions and correspond to economic institutions.

In the absence of competition the organization will choose a strongly motivated manager if asked to in order to make it too expensive for the donor to induce a truthful revelation of information from the altruistic manager. Consequently, the organization will not employ a manager and the donor will be forced to give up the full moral hazard and the mission related information rent to a non-profit firm with a flat organization.

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[9] A field consists of organizations providing similar output and facing the same economic environment in other words a set of structurally equivalent organizations with the same connections to other actors in the field but not necessarily connected to each other. *Coercive isomorphism* refers to homogenization as a consequence of direct or indirect pressure from institutions of importance for the fitness of the organization. *Normative isomorphism* is related to common ethics and norms among professionals as a result of filtering and screening processes. (DiMaggio and Powell, 1983, p.150-154)

When the organizations face competition, they will be forced to employ a value-neutral manager if an institution which can make the manager type observable is used. Such an institution is more likely to be found in the more important sectors of the economy but its efficiency is also dependent on the transaction costs in the firm. This accentuates the importance of screening and filtering processes necessary to make competition effective. When these conditions are satisfied, the donor will pay the manager a fixed wage and a bonus to induce a truthful revelation of the firm's intrinsic motives. A hierarchy with neutral managers is therefore established.

We therefore hypothesize:

(i) Value oriented organizations are either flat or have value-oriented managers if competition is non-existent or the information rents are relatively low.

(ii) The combination of a value-neutral management with a value-oriented organization is linked to a monitoring institution (e.g. human resource institution or a regulatory agency), this arrangement can be observed in competitive environments. This combination is presumably common in more important sectors of the economy where the information rents are relatively high.

(iii) The payments to the manager are commonly high-powered with competition.

The formal contract can be seen as coupled with a non-contractible managerial ethic. The definition of ethic is based on a revealed preference argument. The manager is thought to be faced with a situation which is analogous to experiments such as the ultimatum game. What the manager prefers to do when faced with such a clear cut situation defines his ethics –we emphasize the link between the internal considerations of the manager and the actual outcomes or consequences of his ethical considerations. The distinct cultures of the economy are the Cartesian products of the particular organizations' ethics which correspond to the distinct outcomes. The equilibrium culture may be a subset of these.

APPENDIX

A.1. PROPOSITION 1

If the manager is properly compensated, then he will be truth telling, i.e. will give a truthful report whenever he discovers the type of the organization. The necessary conditions to achieve this are:

(1) $\pi_1 V_S'(q_I^*) + (1 - \pi_1)V_F'(q_I^*) = \mu_I$

(2) $\pi_1 V_S'\left(q_N^{SBM'}\right) + (1 - \pi_1)V_F'\left(q_N^{SBM'}\right) = \mu_N + \frac{p}{1-p}(1 - (1 - \Psi)\varepsilon)\Delta\mu$

Which are the first order conditions to problem (21) The manager has concave preferences for the service and linear preferences for money i.e. payments.

$$\max_{\{(q_I, u_{IF}), (q_N, u_{NF})\}} p\varepsilon W^{FB}$$

$$+ (1 - p\varepsilon) \left[\hat{p} \left(\pi_1 V_S(q_I) + (1 - \pi_1)V_F(q_I) - \mu_I q_I - u_{IF} - \frac{\pi_1 K}{\Delta\pi} \right) \right.$$

$$\left. + (1 - \hat{p}) \left(\pi_1 V_S(q_N) + (1 - \pi_1)V_F(q_N) - \mu_N q_N - u_{NF} - \frac{\pi_1 K}{\Delta\pi} \right) \right] - p\varepsilon\Psi\Delta\mu q_N$$

Which means that the donor can achieve the first best if he compensates the manger so that he becomes truth telling.

$$\text{s.t. } u_{NF} \equiv g_{NF} - \mu_N q_N \geq 0 \text{ and } u_{IF} + \frac{\pi_0 K}{\Delta\pi} \geq u_{NF} + \Delta\mu q_N + \frac{\pi_0 K}{\Delta\pi} \leftrightarrow u_{IF} - u_{NF} \geq \Delta\mu q_N$$

$$\text{Where } U_I \equiv u_{IF} + \frac{\pi_0 K}{\Delta\pi}, U_N \equiv u_{NF} + \frac{\pi_0 K}{\Delta\pi}$$

$$\mathfrak{L} = (1 - p\varepsilon)[\hat{p}(\dots) + (1 - \hat{p})(\dots)] - p\varepsilon\Psi\Delta\mu q_N + \lambda_1 u_{NF} - \lambda_2(u_{NF} - u_{IF} + \Delta\mu q_N)$$

FOC: (eq. 22)

$$\mathfrak{L}'_{q_I} = (1 - p\varepsilon)\hat{p}(\pi_1 V'_S(q_I) + (1 - \pi_1)V'_F(q_I) - \mu_I) = 0 \leftrightarrow \pi_1 V'_S(q_I) + (1 - \pi_1)V'_F(q_I) = \mu_I$$

$$\mathfrak{L}'_{u_{IF}} = -(1 - p\varepsilon)\hat{p} + \lambda_2 = 0 \leftrightarrow \lambda_2 = (1 - p\varepsilon)\hat{p} = (1 - p\varepsilon)\frac{(1 - \varepsilon)p}{1 - p\varepsilon} = (1 - \varepsilon)p$$

(eq.23)

$$\mathfrak{L}'_{q_N} = (1 - p\varepsilon)(1 - \hat{p})(\pi_1 V'_S(q_N) + (1 - \pi_1)V'_F(q_N) - \mu_N) - p\varepsilon\Psi\Delta\mu - \lambda_2\Delta\mu = 0 \leftrightarrow *$$

$$* \leftrightarrow (\pi_1 V'_S(q_N) + (1 - \pi_1)V'_F(q_N) - \mu_N) = \mu_N + \frac{\lambda_2}{1-p}\Delta\mu + \frac{v\varepsilon\Psi\Delta\mu}{1-p} = \mu_N + \frac{(1-\varepsilon)p\Delta\mu}{1-p} +$$

$$\frac{p\varepsilon\Psi\Delta\mu}{1-p} = \mu_N \leftrightarrow \pi_1 V'_S(q_N) + (1 - \pi_1)V'_F(q_N) = \mu_N + \frac{p}{1-p}(1 - (1 - \Psi)\varepsilon)\Delta\mu$$

$$\mathfrak{L}'_{q_N} = -(1 - p\varepsilon)(1 - \hat{p}) + \lambda_1 - \lambda_2 = (1 - p) + \lambda_1 - (1 - \varepsilon)p = \lambda_1 - 1 + p\varepsilon \leftrightarrow$$

$$\lambda_1 \geq 1 - p\varepsilon \geq 0, > 0 \text{ if } p\varepsilon \in (0,1) \text{ then } \bar{u}_l = 0, \text{ so } U_N = \frac{\pi_0 K}{\Delta\pi} \text{ and } U_I = \Delta\mu q_N + \frac{\pi_0 K}{\Delta\pi}$$

A.2. PROPOSITION 2

The neutral manager is most beneficial to the donor, if we are in the B^2-region, then the donor prefers the one closest to $\Psi = T$, i.e. the "golden mean" manager. Moreover, the upper bound for the region is necessarily less than one.

The most economically intuitive way to show this is to let the donor choose the first best, as if he himself directly could decide the type.

$$\max_{\{(q_I, u_{IF}); (q_N, u_{NF}); \Psi\}} v\varepsilon W^{FB} + (1 - v\varepsilon)W - v\varepsilon\Psi\Delta\mu q_N \text{ s.t.} \begin{cases} u_{IF} - u_{NF} \geq \Delta\mu q_N \\ u_{NF} \geq 0, A \geq 0 \end{cases}$$

$$\mathcal{L} = p\varepsilon W^{FB} + (1 - p\varepsilon)[\hat{v}(\dots) + (1 - \hat{p})(\dots)] - p\varepsilon\Psi\Delta\mu q_N + \lambda_1 u_{NF}$$
$$- \lambda_2(u_{NF} - u_{IF} + \Delta\mu q_N) + \lambda_3\Psi$$

Clearly, we have the same optimization procedure as in *proposition 1*, but with the additional condition

$\mathcal{L}'_\Psi = -p\varepsilon\Delta\mu q_N + \lambda_3 = 0 \leftrightarrow p\varepsilon\Delta\mu q_N = \lambda_3$ which by the assumptions of *proposition 1* is greater than zero, hence $\Psi = 0$. If we instead employ the restriction $\Psi \geq c$; $\Psi, c \in (0,1)$ then $\Psi = c$.

The upper bound must be less than one because if it is one or more, then the donor is for any utility function increasing in money at least as well or better off without a manager. If we denote the level of managerial compassion $\Psi \in (T, 1)$ that will leave the risk averse donor indifferent between employing a manager or not as β, then the particular organization ethics is defined by $A \equiv [\alpha, T]$, $B \equiv (T, \beta)$ and $\Gamma \equiv [\beta, \omega]$. The manager cultures are the product of interaction, i.e. the Cartesians A^2, B^2 and Γ^2.

A.3. PROPOSITION 3

The equilibrium manager culture is characterized by a low degree of benevolence towards the organization which means that the manager can be compensated in order to make him truth telling. The culture restricts the behavior to a range from the ethics of neutrality to the golden mean ethics ($\Psi = T$).

Proof

To prove this we must show that the organizations will have managers with preferences that are in the range $A \equiv \Psi \in [\alpha, T]$ in equilibrium. In other words, the set of Nash equlibria are in A^2. To show this, we must in addition show that all other preferences are unstable.

No point in $B \equiv \Psi \in (T, \beta)$ is an equilibrium play for the organizations. Assume that $(\Psi_i, \Psi_j) \in B^2$ is a NE. We employ *lemma a* and *b* in the competition argument, this drives the organizations to undercut each other in order to avoid the zero payoff. By definition it is true that

$O_i(\Psi_i, \Psi_j) \geq O_i(\Psi'_i, \Psi_j) \; \forall \; \Psi'_i$ and $O_j(\Psi_i, \Psi_j) \geq O_j(\Psi_i, \Psi'_j) \; \forall \; \Psi'_j$, $(A_i, A_j) \in B^2$ (*)

where (Ψ_i, Ψ_j) can have the following relationships: (i) $\Psi_i < \Psi_j$ (ii) $\Psi_i = \Psi_j$ (iii) $\Psi_i > \Psi_j$.

Assume (i). Then $O_i(\Psi_i, \Psi_j) = \frac{\pi_0 K}{\Delta\pi} + (1 - \varepsilon)\Delta\mu q_N^B$ and $O_j(\Psi_i, \Psi_j) = 0$ where $\frac{\pi_0 K}{\Delta\pi} + (1 - \varepsilon)\Delta\mu q_N^B$ is the maximal payoff the organization can achieve in this region. Hence $O_i(\Psi_i, \Psi_j) \geq O_i(\Psi'_i, \Psi_j) \; \forall \; \Psi'_i \in B$ but

$O_j(\Psi_i, \Psi_j - \gamma) \geq O_i(\Psi_i, \Psi_j), \gamma \in (0, \Psi_j - T)$, therefore $O_j(\Psi_i, \Psi_j) \geq O_j(\Psi_i, \Psi'_j)$ is not true and we have a contradiction. By symmetry, (iii) can't be true either.

Assume (ii). Then $O_i(\Psi_i, \Psi_j) = O_j(\Psi_i, \Psi_j)$. But then again $O_j(\Psi_i, \Psi_j) \leq O_j(\Psi_i, \Psi_j - \gamma)$ (and similarly for O_i) which is a contradicts (*)

We also note that all upward deviations to the Γ-strategies are ruled out by this reasoning given that we start in B^2 (regions where one organization plays B and the other Γ). Clearly if we assume $(\Psi_i, \Psi_j) \in \Gamma^2$ is a NE, then we know that by our previous assumptions (either $\frac{\pi_0 K}{\Delta \pi} + 2(1 - \varepsilon)\Delta\mu q_N^B > \Delta\mu q_N^{FAI}$ or the donor is "picky") that:

$$O_i(\Psi_i, \Psi_j) = O_j(\Psi_i, \Psi_j) \ \forall \ (\Psi_i, \Psi_j) \in \Gamma^2.$$

But then we can find $A'_i \notin \Gamma$ such that $O_i(\Psi_i, \Psi_j) < O_i(\Psi'_i, \Psi_j)$ and $\Psi'_j \notin \Gamma$ such that the other organizations payoff is $O_j(\Psi_i, \Psi_j) < O_j(\Psi_i, \Psi'_j)$ which contradicts that $(\Psi_i, \Psi_j) \in \Gamma^2$ is a NE.

Hence everything in the region $(T, \omega] \times (T, \omega]$ is not an equilibrium culture.

Assume $(\Psi_i, \Psi_j) \in A^2$, then $O_i(\Psi_i, \Psi_j) = O_j(\Psi_i, \Psi_j) = \frac{1}{2}\left(\frac{\pi_0 K}{\Delta \pi} + (1 - \varepsilon)\Delta\mu q_N^A\right)$

If $\Psi_i \in A$ then $O_i(\Psi_i, \Psi_j) \geq O_i(\Psi'_i, \Psi_j)$ is satisfied and,

If $\Psi_j \in A$ then $O_j(\Psi_i, \Psi_j) \geq O_j(\Psi_i, \Psi'_j)$ is satisfied and,

If $\Psi'_i \notin A$ and $A_j \in A$, then $O_i(\Psi_i, \Psi_j) \geq O_i(\Psi'_i, \Psi_j)$, and

If $\Psi'_j \notin A$ and $A_i \in A$, then $O_j(\Psi_i, \Psi_j) \geq O_j(\Psi_i, \Psi'_j)$

Therefore there are no incentives to deviate upwards if $\Psi_i \in A$ or $\Psi_j \in A$ and A^2 is the equilibrium culture. Note that Γ^2 is an equilibrium culture in the absence of competition or when the organization is endowed. (See figure 2 above)

REFERENCES

Alesina, A. and Tabellini G., (2007), "Bureaucrats or Politicians? Part I: A Single policy Task", *American Economic Review*, 97: 169-179

Alesina, A. and Tabellini, G., (2008), "Bureaucrats or Politicians? Part II: Multiple policy Tasks", *Journal of Public Economics*, 92: 426–447

Anheier, H., (2000), "Managing non-profit organizations: towards a new approach", Civil Society Working Paper series, 1. Centre for Civil Society, London School of Economics and Political Science, London, UK

Anheier, H., (2005), *Nonprofit Organizations*, Routledge, New York

Akerlof, G and Rachel Kranton, E., (2010), "Identity and the Economics of Organizations", *Journal of Economic Perspectives*, 19: 9–32

Besley, T. and M. Ghatak (2005), "Competition and Incentives with Motivated Agents", *American Economic Review*, 95: 616–36

Besley, T. and M. Ghatak (2010) "Mission Integrity in Public Organizations", Draft

Binmore, K. (1990), "Nash Equilibrium" in *Essays on the Foundations of Game Theory*, Basil Blackwell Ltd, Oxford.

Binmore, K. (1993), "Focal Points and Bargaining", *International Journal of Game Theory*, 22: 381-409

Bertrand, M. and Schoar, A., (2003), "Managing With Style: The Effect of Managers on Firm Policies", *Quarterly Journal of Economics*, 4: 1169-1208

Cameron, J., Banko, K. and Pierce, W., (2001), "Pervasive negative effects of rewards on intrinsic motivation: The myth continues", *The Behavior Analyst*, 24: 1–44

Canton, E. (2005), "Power of Incentives in Public Organizations when Employees are Intrinsically Motivated, *Journal of Institutional and Theoretical Economics*, 161: 664–80

Corneo, G. and R. Rob (2003), "Working in Public and Private Firms, *Journal of Public Economics*, 87: 1335–52

Deci, E., Koestner, R. and Ryan, R., (1999a), "A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation", *Psychological Bulletin*, 125: 627–668

DiMaggio, P. and Powell, W., (1983), "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields", *American Sociological Review*, 48: 147–60

Dixit, A. (2005), "Incentive Contracts for Faith-Based Organizations to Deliver Social Services", Economic Theory in a Changing World: Policy Modeling for Growth, Oxford University Press, New Delhi

Delfgaauw, J. and Dur, R. (2010) "Managerial talent, motivation, and self-selection into public management", *Journal of Public Economics*, 94: 654-660

Francois, P., (2003) "Not-for-Profit Provision of Public Services", *The Economic Journal*, 113: 53-61

Francois, P. and Vlassopoulos, M., (2008), "Pro-Social Motivation and the Delivery of Social Services", *CESifo Economic Studies*, 54: 22–54

Forsythe, R., Horowiz, J.L., Savin, N.E., and Sefton, M. (1994), "Fairness in simple bargaining experiments", *Games and Economic Behavior*, 6: 347-69.

Glaeser, E. and A. Shleifer (2001), ''Not-for-Profit Entrepreneurs'', *Journal of Public Economics*, 81: 99–115

Glaeser, E., editor (2002) "The Governance of Not-for-Profit Organizations"http://www.nber.org/books/glae03-1

Gregg, P., Grout, P. A., Ratcliffe, A., Smith, S. and Windmeijer, F., (2011), "How Important is pro-social behavior in the delivery of public services?", *Journal of Public Economics*, 95: 758-766

Hansmann, H., (1980), "The Role of Nonprofit Enterprise", *Yale Law Journal*, 89: 835-901.

James, H. (2005), "Why did you do that? An economic examination of the effect of extrinsic compensation on intrinsic motivation and performance" *Journal of Economic Psychology*, 26: 549–566

Laffont, J, (1999) "Political economy, information and incentives", *European Economic Review*, 43: 649-669

Laffont, J (2001) "Incentives and Political Economy", http://www.oxfordscholarship.com.ludwig.lub.lu.se/oso/public/content/economicsfinance/9780199248681/toc.html (2010-11-17)

Laffont, J and Martimort, D., (2002), *The Theory of Incentives*, Princeton University Press, Princeton

Lewis, D, (2010), "Measurement and Public Service Motivation: New Insights, Old Questions", *International Public Management Journal*, 13: 46 - 55

Locke, E. A. (1991), "The Motivation Sequence, the Motivation Hub and the Motivation Core", *Organizational Behavior and Human Decision Processes*, 50: 288–99

Martimort, D and Pouyet, J. (2008) "To build or not to build: Normative and positive theories of public-private partnerships", *International Journal of Industrial Organization*, 26: 393-411

Perry, J. Wise, L (2010), "Revisiting the Motivational Bases of Public Service: Twenty years of research and an Agenda for the Future", *Public Administration Review*: 681-690

Prendergast, C. (2007), ''The Motivation and Bias of Bureaucrats'', *American Economic Review*, 97: 180–96

Tirole, J., (2001), "Corporate Governance", *Econometrica,* 69: 1-35

Van den Steen, E., (2010), "On the Origins of Shared Beliefs (and corporate culture)", *RAND Journal of Economics*, 41: 617-648

Williamson, O. (1985), *The Economic Institutions of Capitalism*, The Free Press, New York

Williamson, O., (2002), "The Theory of the Firm as Governance Structure: From Choice to Contract", *The Journal of Economic Perspectives*, 16: 171-195

The Citizen and The Educational System

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The development of human capital relies on the body of knowledge shaped at primary and secondary education, the subject of this paper is how the economic organization affects learning outcomes at these two decisive phases. Human capital formation is treated as a game of strategic interaction between a citizen and the educational system consisting of two separate stages which correspond to elementary and higher education. The product of the interaction is human capital and the equilibrium outcome at the first stage affects the student's productivity at the second stage of higher education. This research shows how the intertemporal nature of learning opens up for opportunism between elementary and higher education and limits the scope of using non-profits against cost-savings in the presence of for-profit firms. The character of relevant school reform will in general depend on the impact of changes at the structural level relative to the impact of reform aimed at the interpersonal level within the classroom domain. The analysis suggests that pedagogical orientation and the pupil's aim or predisposition to be forward looking, are important determinants of learning outcomes. We show that what happens between the classroom walls is decisive for how the human capital stock is affected in different contractual settings.

1. INTRODUCTION

Primary and secondary education entails far reaching repercussions on the future well being of the citizen. It will not only affect how she will do at the workplace or her chances at high quality tertiary education but it may also have an impact profound enough to affect her cognitive ability[1]. The simple fact that such productivity increase takes time presents efficiency problems to the organization of the educational system. A tension may come about because it is society as a whole and especially schools at higher education that foremost reap benefits of good students, not the elementary school which prepared them. Hence private elementary school incentives to invest in human capital are limited by the extent it can take credit for students' intellectual development.

In order to approach some of the intertemporal issues it is necessary with a stylized scenario. This paper models human capital accumulation as a game of strategic interaction between a citizen and an educational system consisting of two stages -elementary and higher education. When the citizen is young she is called a *pupil* and attends elementary school where she is prepared for higher studies. Her preparation, which is determined by efforts and investments made by her and the elementary school, will in turn affect her productivity when she interacts with higher education as a *student*. School revenues depend on reputation which in turn depends on grades. Grades are determined by effort and investments at school and due to the interdependence valued by both. At each stage the citizen chooses how much effort to exert and the school its investment level. Each of these actions is associated with private costs but affect at the same time benefits of both actors. Hence the action of each gives rise to positive externalities within and between stages trough productivity enhancing elementary education.

Production relations like these in education differ from the employer-employee case because neither effort nor grades can be contracted. Inter-firm relations are moreover complicated because the bearer of the externality is a free citizen who unlike a physical asset, can't be owned. These conditions therefore defy incentive contracts and asset ownership solutions under incomplete contracts.

Research on the economics of education has a branch of mainly empirical literature where learning outcomes are seen as a function of a given set of inputs. (Bishop 2004) Another branch focuses on different modes of organizations, where the much discussed voucher literature encompasses a theoretical discussion influenced by the work of Manski (1992). De Fraja (2008) provides theoretical work outside the voucher discussion in an otherwise meager microeconomic literature on human capital externalities and contract theory.

Our research addresses this scarcity with a microeconomic model of school and student behavior within the first decisive phases of the educational system. This research also contributes to the incomplete contract theory following from the work of Hart (1986, 1997) and Bennet and Iossa (2006) with refinements by Chen and Chiu (2010). Our study shows

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[1] There is an interesting ongoing discussion about the effect of primary education on cognitive ability. Fredriksson et al., 2012 found for example that larger classes at primary school are associated with a long term negative effect on cognitive ability and wages later in life.

that the determination of firm boundaries is complicated by non-cooperative behavior which may counteract the negotiations made in order to accommodate externalities. This non-cooperative extension is especially a concern in schools and resonates well with the non-contractible nature of student behavior. It also allows a rudimental exploration of the "structure-agent" dichotomy essential to the discussion on the character of school reform because it outlines the scope of improvements of the educational system trough a restructuring of the overarching economic organization.

We believe that important features of the human capital formation process can be captured by a model in the fashion of the incomplete contract literature because neither the behavior of the actors, like effort, or outcomes like grades are contractible. In the jargon of this literature, we treat the services provided by elementary and higher education as two specialized tasks and therefore associate elementary school as a *building phase* and the higher education as a *management phase*. From this perspective, the young citizen, i.e. the pupil, is "built" by the elementary school in terms of preparation and to a greater extent "managed" by the higher education which deals with a student who is in part already shaped by earlier experiences.

Even though our approach commences with this literature, it is at the same time our view that we must depart from the building analogy because it is closely related to one-sided communication whereas education is reciprocal. In doing so, our approach relates to for example Fox (1983) who outlines distinct approaches towards teaching determined by the view on student-teacher interaction. At one extreme the teacher's role is to transmit information to passive receptors and at the other to guide independent students in the exploration of the subject. We allow for a richer interaction and our citizen is therefore more than a mere passive object of investments, she is also active and reacts to the incentives within the system and in doing so links the two educational phases by her attributes and actions.

This research emphasizes that intertemporal externalities open up for opportunistic behavior between schools at different stages of the educational system. An opportunistic high school may for example shirk on investments if it can rely on student effort and a good primary education. This opportunism might therefore limit the scope of altruistic non-profits with the role of safeguards against cost-savings or commitment to a mission (e.g. Schleifer, 1998; Schleifer and Glaeser, 2001; Besley and Ghatak, 2005).

How high schools and students react to preparation is given by the pedagogical orientation defined as how dependent the actors are on the contribution of each other. This relationship named the *educational regime* is central for the functioning of the educational system as it determines how the human capital stock is altered at different contractual forms. Some regimes will be demanding and rely on the efforts of independent students with school investments aimed at the best. Others are characterized by relatively caring schools investing on least prepared. This framework allows for distinctions regarding how the citizen's social background or personal tributes and the educational system determine learning outcomes. The analysis shows that the pupil's sense of purpose or capacity to be forward looking is decisive for her success at school, a myopic citizen will depend entirely on the investments

made by her school and will become an underachiever. Moreover the organization may fail to internalize the effects of a positive externality even if it commits to do so because a non-cooperative strategic behavior between the citizen and the educational system can make such promises futile.

Section two reviews previous literature, section three describes the model and establishes key concepts and definitions such as the educational regime. The first two propositions derived from this model are presented in section four. Section five discusses how the organization of the educational system affects learning outcomes. Section six concludes.

2. RELATED LITERATURE AND CONTRIBUTION

This study makes two contributions. The first one is to the scarce economic literature on the organization of elementary and secondary education. These two stages are treated as an interconnected system where the main concern is the intertemporal aspect of decision making under strategic interaction. The topic of this research therefore differs from the school choice discussion that has received most attention where the crossectional perspective is most common as it focuses on how competitive forces affect segregation in school quality and students' educational attainment. (Manski, 1992; Epple and Romano 2012) McLeod and Urquiola (2009) is a contribution with an intertemporal perspective that explores the labour market signals of school reputation and its effect on student effort exertion. The main methodological difference hinges on the assumption that each student's effect on school payoff is negligible and therefore excludes strategic interaction.

Our approach is related to the work of De Fraja (2008, 2010) in terms of method due to the explicit game theoretical stand on human capital and the emphasis on externalities under incomplete contracts. The view on human capital accumulation as a consequence of several actors' effort held by for example Solon (2004) goes back to the Becker Tomes (1976) model of education investment tradeoffs faced by parents. This perspective has also a game theoretical tradition; a recent work in this direction is De Fraja et al. (2010) who find empirical support for a structural model of student performance motivated by a one-shot simultaneous moves game in effort exerted by parents, children and schools.

The second contribution is to the incomplete contract literature which stems from the work of Hart (1986) and further discussed by Bennet and Iossa (2006, 2010) with application on optimal contractual form and public-private-partnerships to accommodate externalities. We show that attempts to internalize the positive externality of investments on productivity are neglected by the special character of student-school interactions because it differs from the setting with physical assets or the employer-employee relationship under incentive contracts studied by Martimort and Pouyet (2008). The difference originates from the assumption that the citizen can't be owned nor is the product of her actions contractible. This result emerges from the non-contractible citizen-school relation and should be distinguished from the robustness checks of Chen and Chiu (2010) carried out by assuming positive cross partial derivatives on the externalities with respect to the actions of the firms (see also Rhen 2009).

The role of the citizen may in terms of this literature be interpreted and described as a dynamic technology which responds to the investments of the firms.

The intertemporal aspects of opportunism in the educational system has not been discussed much due to the attention occupied by choice and competition has favored a cross sectional perspective. Inefficiencies due to altruism within an incomplete contract framework have previously been pointed out by Bennet and Iossa (2010) and Roy and Chowdhurry (2009) but along the lines of overinvestment or over commitment whereas our point of opportunism is closer to Francois's (2003) quandary regarding mitigated efforts by motivated agents within firms with profit motives because these actors will realize that their efforts matter less for the outcome.

3. THE MODEL

The citizen interacts with the educational system at two distinct phases; called elementary and higher education. Her benefits at a given stage are given by grades determined by the citizen's effort and investments made by the educational system. We therefore consider the following utility function for the citizen:

$$G(e_t, I_t) = B \ln(\alpha_t e_t + \beta_t I_t), t = E, H \tag{1}$$

Which represents the value of the grades, where $B > 0$ and $\alpha_t, \beta_t \geq 0$, $\alpha_t + \beta_t \in (0,1)$, e_t is effort exerted by the citizen at time t, and I_t are investments made by the system at time t and $t = E, H$ are time indexes for the elementary and higher education phases, each component is described in what follows. Vlachos (2011, p.67) argues that school choice is a difficult decision and that the citizens might not have the necessary information to make optimal choices. Information on how the school service affects the human capital accumulation of the pupil is limited and it is in addition hard to hold the schools responsible if the education was of low quality.

Based on these observations, we therefore assume that education quality is difficult to measure and virtually non verifiable, hence can't be enforced by a court, only basic standards can be specified and contracted on. Both the effort of the citizen and her educational environment will determine the human capital accumulation but neither (e_t or I_t) is contractible. What is contractible in terms of investments (I_t) varies with legislation, for example a higher teacher to pupil ratio might be specified in some countries to some extent, but it is arguably more difficult to control improvements of this ratio, investments in pedagogical innovations is another example. This concave function captures the decreasing returns to effort and investments, the marginal benefit of effort exertion and investments are:

$$\frac{\partial G_t(e_t, I_t)}{\partial e_t} = \frac{\alpha_t B}{\alpha_t e_t + \beta_t I_t}, \frac{\partial G_t(e_t, I_t)}{\partial I_t} = \frac{\beta_t B}{\alpha_t e_t + \beta_t I_t} \tag{2}$$

The benefits are proportional to $B \geq 1$, closely associated with differences such as social capital, intrinsic motivation or ability, which enhances the overall value of the human capital investments, $\alpha_t, \beta_t \geq 0$ determine how sensitive human capital is to effort exertion and investments respectively, α_t, β_t are associated with the pedagogical orientation of the system. Gender, ethnicity or socioeconomic status can be thought to affect how much the individual learns from lectures relative to independent work within a educational regime. Evidence suggests for example that the impact of class size interacts with socioeconomic status; Angrist and Lavy (1999) show that the positive effect of smaller classes is increasing in the share of disadvantaged pupils.

Definition a: We call the sum of effort and investments at elementary education ($e_E + I_E$) *preparation* and denote it as Σ_E and we call the sum at higher education ($e_H + I_H$) *knowledge* and denote it Σ_H, asterisks denote equilibrium levels. The sum of preparation and knowledge $\Sigma_E + \Sigma_H$ is called human capital.

The cost function at elementary and higher education is respectively:

$$C_{PE} = e_E \text{ and } C_{PH} = \frac{e_H}{\Sigma_E} \tag{3}$$

Where the index *PE* stands for pupil at elementary school and *PH* denotes the student at higher education. The productivity of the citizen is shaped by the first period education due to the acquisition of general human capital (e.g. see Becker 1964); many skills which are important to later human capital accumulation are in addition best acquired at young age when children are in elementary school. The cost of effort is therefore proportional to exertion at higher education but inversely proportional to elementary school preparation.

The game is solved recursively and this section describes $t = E, H$. The timing is[2]:

$t = E$ "Building Stage": Elementary school and pupil invest and exert effort simultaneously. Implementation of investment requires renegotiation takes place at the end of the period between the owner and investor if owner $\neq$ investor. If owner $=$ investor, then investments with positive gains for the investor are always made. Pupil and elementary school get their payoffs at the end of the stage.

$t = H$ "Management Stage": Elementary school and pupil invest and exert effort simultaneously. Negotiation takes place between the economic actors at the end of the period if owner $\neq$ investor. Payoffs are realized at the end of the period.

To simplify matters we assume that the investments are made simultaneously. This modelling assumption captures the difficulties to synchronize the efforts of student and education in order to attain good results.

We adopt the stylized fact (Vlachos 2011, p.67) that the citizen's objective is to attain the highest possible grades at the lowest possible effort. Consequently, the citizen solves the following problem at higher education:

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[2] Section 5 will introduce an additional where ownership is decided in order to discuss contractual forms.

$$\max_{e_H} B \ln(\alpha_H e_H + \beta_H I_H) - \frac{e_H}{\Sigma_E} \qquad (4)$$

First order condition:

$$\frac{\alpha_H B}{\alpha_H e_H + \beta_H I_H} - \frac{1}{\Sigma_E} = 0$$

This yields

$$e_H = B(e_E + I_E) - \frac{\beta_H}{\alpha_H} I_H$$

School revenues are usually directly related to the number of students either because it charges admission fees or is reimbursed by the state for each student like in Sweden (see for example Vlachos, 2011). Revenues are in any case dependent on the school's reputation, which in turn is connected to the level of grades. Grades do not translate to reputation and benefits perfectly so the objective function of the school and the citizen are similar but the valuation of effort and investments differs. This can be due to different things; one of them is that reputation may be more or less sensitive to the overall results. Moreover the school can benefit from its own investments to a certain degree, this degree of internalization is also captured by ω, the sensitivity of benefits to the efforts of the student is ε.

Definition b: If $\alpha > \beta$, then the student is *independent*, if $\alpha = \beta$ the student is *average* and if $\alpha < \beta$, the student is *disadvantaged*. If $\omega > \varepsilon$, then the school is *caring*, if $\omega = \varepsilon$ the school is *normal* and if $\omega < \varepsilon$, the school is *opportunistic*.

We consider the following objective function for the educational system:

$$R(e_t, I_t) = R_t \ln(\varepsilon_t e_t + \omega_t I_t)$$

Where $\varepsilon, \omega \geq 0$, $\varepsilon + \omega \in (0,1)$ and $R_t \geq 1$ has a similar role as B for the citizen's objective, $t = E, H$. The coefficient R_t is associated with reputation and one source of reputation is the rate at which the weighted sum of effort and investments is translated to reputation. The cost functions are:

$$C_{SE} = C_{SH} = I_t \qquad (5)$$

Where the index *SE* denotes the elementary school and *SH* is for higher education.

The higher education solves the problem:

$$\max_{I_H} R_H \ln(\varepsilon_H e_H + \omega_H I_H) - I_H \qquad (6)$$

This yields

$$I_H = R_H - \frac{\varepsilon_H}{\omega_H} e_H$$

Hence the system

$$\begin{cases} e_H = B\Sigma_E - \dfrac{\beta_H}{\alpha_H} I_H \\[2mm] I_H = R_H - \dfrac{\varepsilon_H}{\omega_H} e_H \end{cases} \tag{7}$$

Note that the student's effort exertion at higher education is enhanced by the first elementary preparation but that the student can substitute her own effort with the investments made by higher education, which at the same time to some extent is able to cut back on investments if the student works harder. A dependent student will tend to rely more on investments whereas an opportunistic education will take advantage of the student's effort to a greater extent than a caring one.

Definition c: $\Delta \equiv \alpha_H \omega_H - \beta_H \varepsilon_H$ is interpreted as the educational system's composition in terms of types and is called the educational regime. The regime is said to be *demanding* if $\Delta < 0$ i.e. when the higher education is relatively more opportunistic than the student independent, the regime is *undemanding* if $\Delta > 0$ i.e. if the student is relatively more independent than education opportunistic.

This interpretation is in a sense related to Fox (1983) different approaches towards teaching. One distinguishable feature of these approaches is the extent the pedagogy focuses on the student's or the teacher's activity in the learning process, he argues that a mismatch in approaches to learning between teachers and students can have adverse effects for the learning experience. We do not take a stand on which style is preferred but rather assume that some students and schools benefit more from independent work whereas some benefit more from teacher led education.

The behavior at higher education is

$$\begin{cases} e_H^* = \dfrac{\omega_H}{\Delta}(\alpha_H B\Sigma_E - \beta_H R_H) \\[2mm] I_H^* = \dfrac{\alpha_H}{\Delta}(\omega_H R_H - \varepsilon_H B\Sigma_E) \end{cases} \tag{8}$$

Where

$$\frac{\partial e_H^*}{\partial e_E} = \frac{\partial e_H^*}{\partial I_E} = \frac{B\alpha_H \omega_H}{\Delta}, \frac{\partial I_H^*}{\partial e_E} = \frac{\partial I_H^*}{\partial I_E} = -\frac{B\alpha_H \varepsilon_H}{\Delta}$$

When the regime is undemanding, the student's best response in terms of effort is positively related to elementary school preparation whereas the higher education's reaction is subject to a crowding out effect i.e. it has a tendency to cut back on investments if it can rely on a good elementary education. The citizen's incentive to exert effort is in this case enhanced by factors like social status or general ability, independence and her productivity increasing skills (preparation). These positive effects are at the same time countervailed by the student's reliance on the reputation of the higher education and her degree of dependence on its investments. The higher education incentive to invest more is a product of its reputation's dependence on its investments i.e. its degree of care. This tendency is partially offset by the education's ability to rely on the students general and acquired ability; the undemanding regime invests more on the citizens who are ill prepared.

When the regime is demanding, the opposite is true because now the relatively disadvantaged student's incentive to exert effort is driven by the reputation and investments of the higher education. Her ability or social status and preparation will now instead tend to dampen her incentives to exert effort. The relatively more effort dependent or opportunistic higher education will have incentives to invest most on the best prepared and this behavior will only be counterweighted by its reputation and degree of care.

Note that in this model, the citizen will be assigned or choose education at each stage and she then sticks to that particular choice, we therefore in effect abstract from matching concerns. This assumption is plausible in the context of school choices because it is monetary and socially costly to change school (see Vlachos 2011, p.67), consequently, we assume that the citizen is subject to a hold-up problem and we can therefore at least as a crude approximation disregard out and inflow of pupils and matching concerns within each stage. The reputational effects on the system are realized at the end of each stage and will affect future applications. We will in what follows assume that $\alpha_E = \beta_E$ and $R_E = B$ in order to simplify the calculations but this will not have a qualitative effect on results.

The equilibrium *knowledge*:

$$\Sigma_H^* = \frac{1}{\Delta}\big(B\alpha_H(\omega_H - \varepsilon_H)\Sigma_E + R_H\omega_H(\alpha_H - \beta_H)\big) \tag{9}$$

Is enhanced *at higher education* by *preparation* at the elementary school if the school is *caring*, is unaffected by it if the school is *normal* and may be depressed by elementary education preparation if the school is *opportunistic* when the system is undemanding and the opposite is true when the system is demanding. The higher education's reputation will have the contemporary effect of enhancing knowledge if the student is *independent*, will have no effect if the student is *average* and will have an adverse effect if the student is *disadvantaged* but the total result will also depend on how reputation affects the plan of action at elementary education, this will be treated in detail in section 4.

When the citizen is forward looking, she will as a pupil at the first period maximize:

$$\max_{e_E} G_E + G_H\big(e_H^*(e_E, I_E), I_H^*(e_E, I_E)\big) - C_{PE}(e_E) \\ - C_{PH}\big(e_H^*(e_E, I_E), I_H^*(e_E, I_E)\big) \tag{10}$$

First order condition:

$$\frac{B}{\Sigma_E} + \frac{B}{\Sigma_E} - 1 - \frac{R_H\beta_H\omega_H}{\Delta\Sigma_E{}^2} = 0 \tag{11}$$

Observation a

If $\Delta \neq 0$, then there exist numbers such that the problem of the citizen (10) is concave. (See appendix)

The elementary school solves

$$\max_{I_E} B\ln(\varepsilon_E e_E + \omega_E I_E) - I_E$$

This yields

$$I_E = B - \frac{\varepsilon_E}{\omega_E} e_E$$

Hence the system

$$\begin{cases} 2B\Sigma_E - \Sigma_E^2 - \dfrac{R_H \beta_H \omega_H}{\Delta} = 0 \\ \quad I_E = B - \dfrac{\varepsilon_E}{\omega_E} e_E \end{cases} \tag{12}$$

The solutions are hence given by (See appendix):

$$\begin{cases} e_E^* = \dfrac{\omega_E}{\omega_E - \varepsilon_E} \left(B^2 - \dfrac{R_H \beta_H \omega_H}{\Delta} \right)^{\frac{1}{2}} \\ \quad I_E^* = B - \dfrac{\varepsilon_E}{\omega_E} e_E^*(c) \end{cases} \tag{13}$$

A more caring school at the elementary school can crowd out some of the pupils effort but a more caring higher education will increase the level of effort. The solution is real if $B^2 > \frac{R_H \beta_H \omega_H}{\Delta}$ and we denote this solution as $e_{PE}^*(c)$.

The equilibrium preparation is:

$$\Sigma_E^* = B + \left(B^2 - \frac{R_H \beta_H \omega_H}{\Delta} \right)^{\frac{1}{2}} \tag{14}$$

The equilibrium human capital is expressed as:

$$\Sigma_E^* + \Sigma_H^* = \frac{1}{\Delta} \left((B\alpha_H(\omega_H - \varepsilon_H) + \Delta)\Sigma_E^* + R_H \omega_H (\alpha_H - \beta_H) \right) \tag{15}$$

4. IMPLICATIONS AND EXTENSIONS

In this section we present and explain results from the basic model with extensions and derive two of the three propositions which summarize the main threads of the paper. The first proposition is derived from a closer examination of a system with stages closely interrelated trough a forward looking citizen who is rather sensitive to anticipated changes at higher education. The second proposition demonstrates the implications of the contrasting case with a myopic citizen. The propositions from here on are true within the convenient set M_{+-} defined in the appendix under proposition 1, this set does not change the qualitative results in any way but servers tractability and is employed for matters of exposition.

4.1. COMPARATIVE STATICS

Observation b: Elementary preparation (eq. 14) increases with the pupil's benefits (B), independence $\left(\frac{\alpha_H}{\beta_H} \right)$ and higher education *care* $\left(\frac{\omega_H}{\varepsilon_H} \right)$.

By (14) and (15) we see that ability or benefits (B) are associated with positive effects on the overall human capital if the higher education is not opportunistic. By the elementary system (13) we note that there is a contemporary crowding out effect on effort exertion if the elementary school is more caring but this effect on *preparation* Σ_E^* is exactly offset by the tendency to invest more by the school.

Definition d: If the effect of reputation on the direction of the human capital stock is determined by its impact on preparation $\left|\frac{d\Sigma_E^*}{dR_H}\right|$ trough the first parenthesis of (15), then the effect is *significant*. If the effect is determined by higher education incentives i.e. the second parenthesis of (15), then the effect is *insignificant*.

The effect of a change in R captures the effect of a change in reputation even though a more direct approach of discussing grades can be achieved by introducing a discrepancy between investments in grades and in human capital represented by two different functions where grades comes at a lower cost. This would of course depress the investments in human capital. We choose to maintain "a gentlemanly distance between assumptions and conclusions" (Akerlof 2010).

Proposition 1: The educational regime determines the effect of reputation on human capital when the effect of higher education reputation on preparation $\left|\frac{d\Sigma_E^*}{dR_H}\right|$ is significant. The effect on equilibrium human capital is positive if the system is demanding ($\Delta < 0$) and the effect is negative if the system is undemanding ($\Delta > 0$). (See appendix)

The point made by proposition 1 is that the effect of a change in reputation depends on citizen and education type but *relative rather than absolute differences between types matter*. If higher education is relatively more caring than the student disadvantaged i.e. the system is undemanding and the response from the citizen at elementary school from an increase in reputation is to exert less effort. A relatively independent citizen will maximize her utility by decreasing effort at elementary education if she knows that higher education gains more if grades are easily achieved. This decrease in effort exertion will not be entirely offset by an increase in investments on the behalf of elementary education; hence the total effect on equilibrium preparation is negative. When the system is demanding i.e. the student is relatively more dependent than the higher education caring, then the best response from the pupil is to work harder in order to attain higher grades, the elementary school will at the same time act opportunistically and invest less in order to maximize profits but will not offset the increase in effort by the pupil entirely. Therefore when the reputation effect is significant, then the demanding educational regime will induce a positive and the undemanding regime a negative effect on equilibrium human capital.

4.2. MYOPIC AND FORWARD LOOKING CITIZENS

We have so far assumed that the citizen is forward looking; this is an assumption in need of further discussion. One way of arguing that the young citizen can be forward looking within this framework, while maintaining the assumption that she can't be owned by the educational system, is by introducing parents. In this case the citizen does not necessarily own herself at the first stage because the parents might have control rights and she will in this event be

forced to bargain with or even commit to a plan of action dictated by them. In the absence of parents, the citizen can at one extreme be completely myopic and treat each stage separately. These different scenarios have a straight forward interpretation - they are associated with how functional the family is. If the citizen is forward looking she is in effect taking the full responsibility for the consequences of her actions.

Proposition 2: When the citizen is myopic then (i) equilibrium effort at elementary education is set to a minimum $e_E^* = 0$ and the equilibrium preparation consists entirely of the investments made by elementary education and is depressed to $\Sigma_E^* = B$. (ii) The preparation is entirely determined by the characteristics of the citizen $\Sigma_E^* = B_P$, independently of school characteristics. (Index p for pupil, see appendix)

This result follows naturally from the fact that the myopic citizen is unable to internalize the productivity enhancing effect of primary education and will only consider the contemporary benefits and costs. This result highlights the importance of socioeconomic factors and the role of parents. It is also of importance to observe that the ability of the citizen at higher education will be negatively affected by a background without a forward looking family and preparation will moreover be entirely determined by her personal attributes. The equilibrium human capital decreases as a consequence (eq. 15).

5. CONTRACTING REGIMES

The proposition derived in this section relates the educational regime to the contractual setting of the organization. The organization of the educational system is treated as a result of negotiations between schools in order to accommodate the positive skill-externality across stages. The agent-structure dichotomy is accentuated by the non-cooperative nature of citizen-school interaction because it interferes with the cooperative character of negotiations between schools. We have so far perceived each stage as a separate business, this section considers different modes of private provision in order to analyze the effect of ownership on the human capital stock. We stay true to previous literature (Bennet and Iossa 2006, 2010; Chen and Chiu, 2010) by assuming the investment decision is a residual right which can't be verified ex ante but is observable. Ownership is in this setup the right to unilaterally block the implementation of the investment, these rights are allocated in the initial period of the game. In terms of the previously presented timing of the game, a new initial period is introduced, $t = 0$, where ownership is allocated to one of the firms. Actions and objective functions are unverifiable.

To be more specific regarding the nature of the negotiation, think of the situation where a corporate group specialized in elementary or higher education considers the acquisition of new schools at another educational phase. The directors of the new school will still benefit from success but a pre-specified share of the new school's profit will go to the owners and this share is determined by a Nash bargain between the owners and the acquisition. Note that the externality of elementary education to higher education in terms of more productive citizens does not necessarily accrue higher education assuming that the citizen can choose her education freely. The link between the stages is established due to a common brand name and

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hence shared reputation. More students will choose a higher education within the corporate group if they are content with the service, which they are if they have better grades, which in turn are proportional to equilibrium preparation. Equilibrium preparation determines the revenue of the elementary school to be shared when higher education owns and expands to elementary education. It also determines the productivity of the students which indirectly affects the profits of higher education, these profits are shared when elementary education owns and expands. All objects included in the Nash bargain in terms of benefits with associated disagreement points are therefore relevant parts of the negotiation between schools.

We denote $R_t(e_t, I_t)$ as R_t and $R_t(e_t, 0)$ as R_t^0 in what follows. Assume ownership is allocated to an elementary education group at $t = 0$, then net benefit under negotiation at $t = H$ is $R_H - I_H$. The disagreement point is $(d_E^E, d_H^E) = (0, R_H^0 - I_H)$ because elementary education will not benefit from higher education investments and higher education will receive the zero-investment payoff with sunken cost if bargain breaks down. The resulting split of the bargain is denoted (π_E, π_H). The Nash product is therefore:

$$\max_{\pi_E} \pi_E(R_H(e_H, I_H) - R_H(e_H, 0) - \pi_E) \tag{16}$$

With the resulting division of surplus

$$(\pi_E, \pi_H) = \left(\frac{R_H - R_H^0}{2}, \frac{R_H - R_H^0}{2} - I_H \right) \tag{17}$$

Higher education will maximize its share π_H, which yields the new best response function

$$I_H = \frac{1}{2} R_H - \frac{\varepsilon_H}{\omega_H} e_H \tag{18}$$

The best response function of elementary education is unchanged.

When higher education is endowed with ownership rights at $t = 0$ and expands, then the net benefit of implementation under negotiation at $t = E$ is the direct benefit of elementary school investment and its influence on higher education payoff net of investment costs is in a similar manner $R_E(e_E, I_E) + R_H(e_H^*(e_E, I_E), I_H^*(e_E, I_E)) - I_E \equiv R_E + R_H^* - I_E$ where the effect of I_E on higher education benefits is evaluated at equilibrium play, and the disagreement point is $(d_E^H, d_E^H) = \left(R_E(e_E, 0) - I_E, R_H(e_H^*(e_E, 0), I_H^*(e_E, 0)) \right) \equiv (R_E^0 - I_E, R_H^{*0})$ where d_E^H is analogous to d_H^H but the disagreement point of the higher education is now conditioned by the zero-investment of elementary education. Note that the positive externality is borne by the citizen as a more able student. This externality can't be included directly in the bargaining between the firms as in the case of physical assets because the citizen can't be owned. The elementary school is on the other hand forced to take the higher education reputation into account when choosing its investment level.

The resulting Nash product is:

$$\max_{\pi_H}(\pi_H - R_H^{*0})(R_E + R_H^* - R_E^0 - \pi_H) \tag{19}$$

The result of the bargain is:

$$(\pi_E, \pi_H) = \left(\frac{R_E + R_E^0 + R_H^* + R_H^{*0}}{2} - I_E, \frac{R_E - R_E^0 + R_H^* - R_H^{*0}}{2}\right) \tag{20}$$

Elementary education will then maximize π_E which in turn implies the following best response function

$$I_E = \frac{1}{2}R_E - \frac{\varepsilon_E}{\omega_E}e_E \tag{21}$$

The best response function of higher education is unchanged.

It is worthwhile to notice that the *higher education benefits have no influence on the decisions of elementary education even though it seeks to internalize the effect of its actions on higher education* as seen in eq. (20). The interaction between the student and the higher education settles a benefit level which is independent on the investments of elementary education i.e. R_H^* is constant.

Proposition 3: When the reputation is significant, then the effect of elementary education ownership on human capital is negative if the system is demanding and positive if the system is undemanding. When higher education owns, then the effect is a decrease in human capital. (See appendix)

Proposition 3 states the effects of forward and backward integration, the proposition follows directly from observation b and proposition 1. A salient feature of this result is the absence of influence from the higher education externality on elementary school investment decisions even when it commits to internalize higher education benefits. It is instead the educational regime that determines how the human capital stock is affected by ownership.

6. SUMMARY AND CONCLUSIONS

Limited contractability of grades, efforts and investments with externalities makes the incomplete contract framework a natural starting point in the analysis of education. This research shows these education characteristics not only make incentive contracts unfeasible, they also challenge asset ownership solutions to the accommodation of externalities. The derivation of proposition three reveals that what happens "between classroom walls" neglects commitments by elementary education to internalize the positive externality under higher education ownership.

This result emerges from the fact that the citizen embodies the positive productivity externality and interacts with the educational system in an independent fashion; her actions are not contractible nor can she be owned like an asset and will therefore not be the direct subject of negotiations. Higher education reputation is incorporated in the bargain instead but

takes a level entirely determined by the student-high school interaction and stands unaffected by elementary education investments. This demonstrates how the determination of an optimal contractual form is complicated by the elusiveness of human capital externalities.

The educational system therefore remains vulnerable to opportunism across stages and the scope for non-profits is limited when these operate alongside for-profits. Commitment to high quality preparation could be responded with lower investments or effort exertion at higher education. The first proposition underscores the importance of the pedagogical orientation (i.e. how dependent the student is in relation to how caring the school is) for learning outcomes. Pedagogical orientation determines incentives to invest and exert effort and decides how the actors at higher education respond to good preparation, undemanding regimes invest more on the less prepared, demanding more on the best prepared.

Emphasis on the future effects of preparation naturally touches the issue of expectations. Proposition two shows how expectations associated with underlying socioeconomic conditions can determine the citizen's learning outcomes. It states that a myopic citizen who lacks a sense of direction will make a minimal effort and depend fully on the preparation provided by elementary school at a level which corresponds to her ability. This proposition highlights the responsibility of parents or schools in making the young citizen work at a level which internalizes the productivity enhancing effect of effort at elementary education on higher education.

APPENDIX

A.1. OBSERVATION A

If $\Delta \neq 0$, then there exist numbers such that the problem of the citizen (10) is concave.

We will show that if $\Delta < 0$, then the citizen's problem is always concave and if $\Delta > 0$, then the problem is concave only if $\Sigma_E > \frac{R_H \beta_H \omega_H}{B\Delta}$, where $\Sigma_E = e_E + I_E > 0, e_E, I_E \geq 0$.

The citizen's problem (eq. 10) is denoted:

$$\max_{e_E} P_E(e_E, I_E) =$$
$\max_{e_E} G_E + G_H(e_H^*(e_E, I_E), I_H^*(e_E, I_E)) - C_{PE}(e_E) - C_{PH}(e_H^*(e_E, I_E), I_H^*(e_E, I_E))$. By (8) we see that $\alpha_H e_H^* + \beta_H I_H^* = B\alpha_H \Sigma_E$, hence $G_H(e_H^*, I_H^*) = B\ln(B\alpha_H \Sigma_E)$.

$$\text{Using (3) and (8), we see that } C_{PH}(e_H^*, I_H^*) = \frac{e_H}{\Sigma_E} = \frac{B\alpha_H \omega_H}{\Delta} - \frac{R_H \beta_H \omega_H}{\Delta \Sigma_E}$$

$$\text{Therefore } \frac{\partial G_H(e_H^*, I_H^*)}{\partial e_E} = \frac{B}{\Sigma_E} \text{ and } \frac{\partial C_H(e_H^*, I_H^*)}{\partial e_E} = \frac{R_H \beta_H \omega_H}{\Delta \Sigma_E^2}$$

$$\frac{\partial G_H^*}{\partial^2 e_E} = \frac{\partial G_H^*}{\partial^2 I_E} = -\frac{2B}{\Sigma_E^2} \text{ and } \frac{\partial C_H^*}{\partial^2 e_E} = \frac{\partial C_H^*}{\partial^2 I_E} = -\frac{2R_H \beta_H \omega_H}{\Delta \Sigma_E^3}$$

$$\frac{\partial P_E(e_E, I_E)}{\partial^2 e_E} = \frac{\partial P_E(e_E, I_E)}{\partial^2 I_E} = \frac{\partial P_E(e_E, I_E)}{\partial e_E \, \partial I_E} =$$

$$-\frac{2B}{\Sigma_E^2} + \frac{2R_H \beta_H \omega_H}{\Delta \Sigma_E^3} < 0$$

and this last second derivative is always less than zero if $\Delta < 0$ but if $\Delta > 0$ then the inequality holds if $\frac{R_H \beta_H \omega_H}{B\Delta} < \Sigma_E$. Therefore $\frac{\partial P_E(e_E, I_E)}{\partial^2 e_E} \frac{\partial P_E(e_E, I_E)}{\partial^2 I_E} - \left[\frac{\partial P_E(e_E, I_E)}{\partial e_E \, \partial I_E}\right]^2 = 0$ can be made sufficient for concavity if $\Delta \neq 0$.

A.2. Equilibrium effort in system 13

Equilibrium effort is derived in order to aid the reader. The system (12) yields the following second degree equation:

$$\left(e_E + I_E(e_E)\right)^2 - 2B\left(e_E + I_E(e_E)\right) + \frac{R_H \beta_H \omega_H}{(\alpha_H \omega_H - \beta_H \varepsilon_H)} = 0$$

$$= \left(\frac{B\omega_E + (\omega_E - \varepsilon_E)e_E}{\omega_E}\right)^2 - 2B\left(\frac{B\omega_E + (\omega_E - \varepsilon_E)e_E}{\omega_E}\right) + \frac{R_H \beta_H \omega_H}{(\alpha_H \omega_H - \beta_H \varepsilon_H)}$$

$$\rightarrow (B\omega_E)^2 + 2B(\omega_E - \varepsilon_E)\omega_E e_E + (\omega_E - \varepsilon_E)^2 e_E^2 - 2(B\omega_E)^2 - 2B(\omega_E - \varepsilon_E)\omega_E e_E$$

$$+ \frac{R_H \beta_H \omega_E^2 \omega_H}{(\alpha_H \omega_H - \beta_H \varepsilon_H)} = 0$$

$$\Rightarrow e_E = \pm \frac{\omega_E}{\omega_E - \varepsilon_E}\left(B^2 - \frac{R_H \beta_H \omega_H}{\Delta}\right)^{\frac{1}{2}}$$

Which is equilibrium effort in system 13, note that it can be made positive for both solutions by trough the degree of elementary school care ω_E, ε_E.

A.3. Proposition 1

The educational regime determines the effect of reputation on human capital when the effect of higher education reputation on preparation $\left|\frac{d\Sigma_E^*}{dR_H}\right|$ is significant. The effect on equilibrium human capital is positive if the system is demanding ($\Delta < 0$) and the effect is negative if the system is undemanding ($\Delta > 0$).

The necessary conditions are characterized by two lemmas. *Lemma a* below pins down the possible range of R_H, R. The relevant restrictions which R must satisfy are (i) The concavity condition (CC), (ii) the positive solution (PS) and (iii) the real solution condition (RS). *Lemma b* shows the existence of a significant effect with the aid of lemma a.

Proposition 1 is about how eq. (15) changes, observe that:

$$\frac{d}{dR_H}(\Sigma_E^* + \Sigma_H^*) = \frac{1}{\Delta}\left((B\alpha_H(\omega_H - \varepsilon_H) + \Delta)\frac{d\Sigma_E^*}{dR_H} + \omega_H(\alpha_H - \beta_H)\right) \qquad (*)$$

$$\left|\frac{d\Sigma_E^*}{dR_H}\right| = \frac{1}{2}\left(\frac{\beta_H\omega_H}{\Delta}\right)\left(\frac{1}{B - \frac{R_H\beta_H\omega_H}{\Delta}}\right)^{\frac{1}{2}} \qquad (**)$$

$$\frac{d\Sigma_E^*}{dR_H} > 0 \text{ if } \Delta < 0 \text{ and } \frac{d\Sigma_E^*}{dR_H} < 0 \text{ if } \Delta > 0$$

Lemma a: When $\Delta > 0$ then $\sup(R) \equiv \overline{R}$, is given by RS and $\inf(R) \equiv \underline{R}$, is given by PS and can be made arbitrarily close to zero. When $\Delta < 0$ then only the PS is relevant.

We first note that we need two sets of parameters depending on the educational regime. If $\Delta > 0$ then we see from (8) that the condition on R_H for a positive solution (PS) is

$R_+^{PS} \in \left(\frac{\varepsilon_H}{\omega_H}B\Sigma_E, \frac{\alpha_H}{\beta_H}B\Sigma_E\right)$ which is consistent with $\Delta > 0 \Leftrightarrow \frac{\alpha_H}{\beta_H} > \frac{\varepsilon_H}{\omega_H}$. If $\Delta < 0$, then we see that $R_-^{PS} \in \left(\frac{\alpha_H}{\beta_H}B\Sigma_E, \frac{\varepsilon_H}{\omega_H}B\Sigma_E\right)$ which is consistent with $\Delta < 0$. Note also that the open interval $\left(\underline{R}, \overline{R}\right)$ can be increased without contradicting the assumption on the sign of Δ and this will not have any adverse consequence at Σ_E^*, especially we could set $\underline{R}$, which is determined by PS, arbitrarily close to zero.
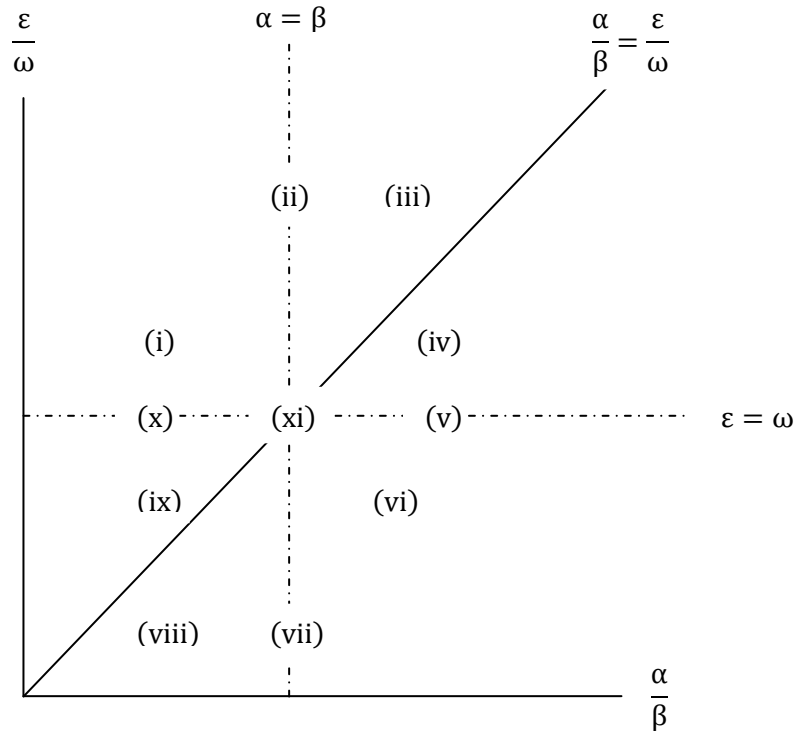
Observation a states the concavity condition (CC) that must be satisfied if $\Delta > 0$, where $\overline{R}^{CC} < B\Sigma_E\left(\frac{\alpha_H}{\beta_H} - \frac{\varepsilon_H}{\omega_H}\right) \equiv \overline{R}_+^{PS} - \underline{R}_+^{PS}$ is defined as the maximum value which satisfies the restriction. Finally we have the real solution condition (RS) which is a real number given by eq. (14), apparently $\overline{R}^{RS} < B^2\left(\frac{\alpha_H}{\beta_H} - \frac{\varepsilon_H}{\omega_H}\right) < \overline{R}^{CC}$ in equilibrium. Hence we have the relationship $\overline{R}^{RS} \subset \overline{R}^{CC} \subseteq R_+^{PS}$ and the real solution condition is the only relevant restriction for $\overline{R}$ when $\Delta > 0$. When $\Delta < 0$, we see by *observation a* and eq. (14) that only the PS is relevant.

Lemma b: A significant effect $\left|\frac{d\Sigma_E^*}{dR_H}\right|$ exists if $\Delta \neq 0$.

Note fist that $\left|\frac{d\Sigma_E^*}{dR_H}\right|$ is increasing in R_H when $\Delta > 0$ and can be made arbitrarily large when R_H approaches RS which is the only restriction we need to satisfy according to lemma a, moreover it has a minimum value for $R_H = 0$. This minimum value is $\frac{1}{2}\left|\frac{\beta_H\omega_H}{B\Delta}\right|$. When $\Delta < 0$, the effect is decreasing in R_H and it has its highest value $\frac{1}{2}\left|\frac{\beta_H\omega_H}{B\Delta}\right| = \frac{1}{2B}\frac{1}{\frac{\varepsilon_H}{\omega_H} - \frac{\alpha_H}{\beta_H}}$ when $R_H = 0$ which can be made arbitrarily large without violating PS.

PROOF OF PROPOSITION 1

The proposition is shown by employing lemma a, lemma b and $(*)$ to construct the set which maps school and citizen types to the direction of change in the human capital stock when reputation changes. This set is made in order to simplify the analysis but does not interfere with the qualitative results. The direction is determined by the first parenthesis of $(*)$ and the sign of Δ when reputation is significant. We start by giving an account of possible school and student type combinations (x, y) (which is a set) compatible with each sign of Δ, where $x \in \{C, N, O\}$ are school types and $y \in \{A, D, I\}$ are student types according to definition b.

$$M_+ = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \right\}, M_- = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \right\}$$

   i. $(O, D) = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \text{ and } \alpha < \beta \text{ and } \varepsilon > \omega\right\} \subseteq M_-$

   ii. $(O, A) = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \text{ and } \alpha = \beta \text{ and } \varepsilon > \omega\right\} \subseteq M_-$

   iii. $(O, I)_- = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \text{ and } \alpha > \beta \text{ and } \varepsilon > \omega\right\} \subseteq M_-$

   iv. $(O, I)_+ = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \text{ and } \alpha > \beta \text{ and } \varepsilon > \omega\right\} \subseteq M_+$

   v. $(N, I) = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \text{ and } \alpha > \beta \text{ and } \varepsilon = \omega\right\} \subseteq M_+$

   vi. $(C, I) = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \text{ and } \alpha > \beta \text{ and } \varepsilon < \omega\right\} \subseteq M_+$

   vii. $(C, A) = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \text{ and } \alpha = \beta \text{ and } \varepsilon > \omega\right\} \subseteq M_+$

   viii. $(C, D)_+ = \left\{(x,y)\big|\alpha_H\omega_H > \beta_H\varepsilon_H \text{ and } \alpha < \beta \text{ and } \varepsilon < \omega\right\} \subseteq M_+$

   ix. $(C, D)_- = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \text{ and } \alpha < \beta \text{ and } \varepsilon < \omega\right\} \subseteq M_-$

   x. $(N, D) = \left\{(x,y)\big|\alpha_H\omega_H < \beta_H\varepsilon_H \text{ and } \alpha < \beta \text{ and } \varepsilon = \omega\right\} \subseteq M_-$

   xi. $(N, A) = \left\{(x,y)\big|\alpha_H\omega_H = \beta_H\varepsilon_H \right\} = \emptyset \in M_-, M_+$

Where $M_- \cap M_+ = \emptyset$ and we define the set M as the union of these two subsets once we have determined if (O, I) and (C, D) belongs to M_- or M_+. We first observe that $(O, I), (C, D)$ which may belong to (iii), (iv) or (viii), (ix) respectively, we must therefore specify which subset these two are restricted to.

Assume (a) that the background factor B is big but not infinite, this condition is satisfied by $B \left| \frac{\alpha_H(\omega_H - \varepsilon_H)}{\Delta} \right| > 1$ if $\omega_H \neq \varepsilon_H$; (b) $\Delta < 0$ (M_-) and (c) R_H satisfies *lemma a*. Then by *lemma b*, there exists a significant effect $\left| \frac{d\Sigma_E^*}{dR_H} \right|$ hence by (a) $B\frac{\alpha_H(\omega_H - \varepsilon_H)}{\Delta}$ or $\frac{d\Sigma_E^*}{dR_H}$ determines the direction of the human capital stock ($*$). We then see that the direction of ($*$) is positive for all the types $(O, D), (O, A), (O, I)$ and (N, D) but negative in (C, D). Now assume (b') i.e. $\Delta > 0$ (M_+). Now $(C, I), (N, I), (C, D)$ and (C, A) are associated with a negative direction on ($*$) and (O, I) is still positive. This means that all pairs change sign with Δ except (O, I) and (C, D). We can therefore for purpose of exposition set $(O, I) \subseteq M_-$ i.e. (iii) and $(C, D) \subseteq M_+$ i.e. viii. We arrive at the following subset:

$$M_{+-} = \{(x, y) \in M_- \cup M_+ | (C, D) \subseteq M_+, (O, I) \subseteq M_- \} =$$

$$M_+ \setminus (O, I) \cup M_- \setminus (C, D)$$

Significant $\left| \frac{d\Sigma_E^*}{dR_H} \right|$ $\qquad$ Insignificant $\left| \frac{d\Sigma_E^*}{dR_H} \right|$

M_{+-} $\qquad\qquad\qquad$ M

	I	A	D
C	−	−	−
N	−	∅	+
O	+	+	+

	I	A	D
C	+	+	±
N	+	∅	+
O	+	+	+

These two sets map school and citizen types to direction of change in human capital due to a change in reputation. The leftmost table showcases *proposition 1*, the rightmost table shows that the direction human capital stock is positive when $\left| \frac{d\Sigma_E^*}{dR_H} \right|$ is negligible unless $(C, D) \in M_-$.

A.4. PROOF OF PROPOSITION 2

Proposition 2: When the citizen is myopic then (i) equilibrium effort at elementary education is set to a minimum $e_E^* = 0$ and the equilibrium preparation consists entirely of the investments made by elementary education and is depressed to $\Sigma_E^* = B$. (ii) The preparation is entirely determined by the characteristics of the citizen $\Sigma_E^* = B_P$, independently of school characteristics.

Proof:

The elementary education problem of the citizen is now reduced to (index p for pupil)

$$B_P \ln(\alpha_E e_E + \beta_E I_E) - e_E$$

The problem of the education is the same and we get:

$$\begin{cases} e_E = B_P - \dfrac{\alpha_E}{\beta_E} I_E \\ I_E = R_E - \dfrac{\varepsilon_E}{\omega_E} e_E \end{cases}$$

Which yields

$$\begin{cases} e_E^* = \dfrac{\omega_E}{\Delta_E}(\alpha_E B_P - \beta_E R_E) \\ I_E^* = \dfrac{\alpha_E}{\Delta_E}(\omega_E R_E - \varepsilon_E B_P) \end{cases}$$

$$\Sigma_E^* = \frac{1}{\Delta_E}(\alpha_E(\omega_E - \varepsilon_E)B_P + \omega_E(\alpha_E - \beta_E)R_E)$$

(i) Follows from our maintained assumptions (in order to make a meaningful comparison) $B_P = R_E = B$, $\alpha_E = \beta_E$. We see (ii) by setting $\alpha_E = \beta_E$ when we bother to make a clear distinction between school and pupil benefits i.e. $B_P \neq R_E$.

A.5. PROOF OF PROPOSITION 3

Proposition 3: When the reputation is significant, then the effect of elementary education ownership on human capital is negative if the system is demanding and positive if the system is undemanding. When higher education owns, then the effect is a decrease in human capital.

Proof:

The proposition follows immediately from *observation b* and *proposition 1*. Note that equations (18) and (21) correspond to the bests response functions in systems (7) and (12) and that any change in the form $R_t' = \delta R_t, \delta \in (0,1)$ will affect the system in such way that R_t' substitutes R_t in eq. (15). We denote $R_H^E = \frac{1}{2}R_H$ and $R_E^E = \frac{1}{2}R_E$. The first case of elementary school ownership and 'forward integration' yields a lower reputation factor R_H^E associated with a decrease of $\frac{1}{2}R_H$ in eq. (15) and hence by proposition 1, human capital increases if $\Delta > 0$ and decreases if $\Delta < 0$. In the same manner, eq. (21) implies that R_E^E decreases to $\frac{1}{2}R_E$ in eq. (15), hence by observation a, human capital decreases ($R_E = B$).

REFERENCES

Akerlof, G. and Kranton R., (2010), *Identity Economics*, Princeton University Press, Princeton

Becker, G., (1962), "Investment in Human Capital: A Theoretical Analysis" *Journal of Political Economy*, 70: 9-49

Becker, G. and Tomes, N., (1976), "Child Endowments and the Quantity and Quality of Children", *Journal of Political Economy*, 84: 143-162

Bennet, J. and Iossa, E., (2006), "Building and managing facilities for public service", *Journal of Public Economics*, 90: 2143-2160

Bennet, J. and Iossa, E., (2010), "Contracting out public service provision to not-for-profit firms", *Oxford Economic Papers*, 62: 784–802

Besley, T. and Ghatak, M., (2005), "Competition and Incentives with Motivated Agents", *American Economic Review*, 95: 616–36

Bishop, J., (2004), "Drinking from the fountain of knowledge: Student incentive to study and learn-externalities,information problems and peer pressure" (CAHRS Working Paper #04-15). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies. http://digitalcommons.ilr.cornell.edu/cahrswp/19

Chen, B., Chin, S., (2010), "Public–private partnerships: Task interdependence and contractibility", *International Journal of Industrial Organization*, 28: 591-603

Chowdhury, P. and Roy, J., (2009), "Public-private partnerships in micro-finance: Should NGO involvement be restricted? ", Journal of Development Economics, 90: 200–208

De Fraja, G., (2007), "Market and public provision in the presence of human capital externalities", *Journal of Public Economics*, 92: 962-985

De Fraja, G., Oliveria, T. and Zanchi, L., (2010), "Must try harder. Evaluating the Role of effort on Examination Results", *Review of Economics and Statistics*, 92: 577-597

Epple, D. and Romano, R., (2012), "Economic Modeling and Analysis of Educational Vouchers", *The Annual Review of Economics*, 4: 159-183

Francois, P., (2003), "Not-for-Profit Provision of Public Services", *The Economic Journal* 113: 53-61

Fox, D., (2003), "Personal Theories of Teaching", *Studies in Higher Education*, 8: 151-163

Glaeser, E. and Shleifer A., (2001), ''Not-for-Profit Entrepreneurs'', Journal of Public Economics, 81: 99–115

Hart, O., (1997), "The Proper Scope of Government: Theory and an Application to Prisons", *Quarterly Journal of Economics*, 1127-1161

Hart, O., (2003), "Incomplete Contracts and Public Ownership: Remarks, and an Application to Public-Private Partnerships", *The Economic Journal*, 113: 69-76

Hartman, L., (red), (2011), *Om konkurrensens konsekvenser – Vad händer med svensk välfärd*, SNS förlag, Stockholm

MacLeod, W. and Urquiola, M., (2007), "Anti-Lemmons: School Reputation and Educational Quality" Working Paper 15112 NBER, Cambridge.

"Reputations, Relationships, and Contract Enforcement" *Journal of Economic Literature*, 45: 595-628

Martimort, D. and Pouyet, J., (2008), "Contracting out public service provision to not-for-profit firms", *International Journal of Industrial Organization*, 26: 393-411

Rhen, E., (2009), *Social Insurance, Organization and Hospital Care*, PhD dissertation, Department of Economics, Lund University.

Shleifer, A., (1998), "State versus Private Ownership", *Journal of Economics Perspectives*, 12: 133-150

Solon, G., (2004), *A Model of Intergenerational Mobility Variation Over Time and Place* In: Corak, M., (Ed.), Generational Income Mobility in North America and Europe. Cambridge University, Cambridge, UK, 38-47