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THE ECONOMICS OF HIGHER PURPOSE

Finance Working Paper N° 395/2013
December 2013

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ECGI Working Paper Series in Finance

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Abstract

We develop a theory of how the intersection of business goals and the pursuit of "higher purpose"—something that produces a non-pecuniary social benefit valued by the principal and the agent — affects economic outcomes. Two types of principals — those pursuing only wealth maximization and those pursuing both wealth and a higher purpose — are considered. These are typically viewed as competing approaches to running organizations. However, the theory we develop, which shows that the pursuit of higher-purpose projects reduces labor costs and increases capital investments, highlights a potential complementarity between the principals pursuing a higher purpose and those exclusively pursuing wealth. The complementarity arises because the pursuit of higher-purpose projects by others can relax budget constraints for wealth-maximizing principals, and the presence of purely-wealth-maximizing principals may be essential for the higher-purpose-pursuing principals to obtain external financing. The absence of either type of principal may lead to a market breakdown involving no projects being undertaken.

Keywords: Higher purpose, budget constraints, wealth maximization

JEL Classifications: Q01, Q32, Z1

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Electronic copy available at: http://ssrn.com/abstract=2362454

First Draft, January 1, 2012
Revised, August 17, 2013

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ABSTRACT

We develop a theory of how the intersection of business goals and the pursuit of "higher purpose"— something that produces a non-pecuniary social benefit valued by the principal and the agent — affects economic outcomes. Two types of principals — those pursuing only wealth maximization and those pursuing both wealth and a higher purpose — are considered. These are typically viewed as competing approaches to running organizations. However, the theory we develop, which shows that the pursuit of higher-purpose projects reduces labor costs and increases capital investments, highlights a potential complementarity between the principals pursuing a higher purpose and those exclusively pursuing wealth. The complementarity arises because the pursuit of higher-purpose projects by others can relax budget constraints for wealth-maximizing principals, and the presence of purely-wealth-maximizing principals may be essential for the higher-purpose-pursuing principals to obtain external financing. The absence of either type of principal may lead to a market breakdown involving no projects being undertaken.

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THE ECONOMICS OF HIGHER PURPOSE

"Purpose is the deepest dimension within us – our central core or essence – where we have a profound sense of who we are, where we came from and where we're going. Purpose is the quality we choose to shape our lives around. Purpose is a source of energy and direction."
Leider (1997)

I. INTRODUCTION

The view that individuals are purely selfish expected utility maximizers whose utility is defined over personal consumption/wealth has been the dominant paradigm in Economics. Nevertheless, there has also been recognition that individuals care about other things like integrity, honesty, social identity and reputation (e.g. Akerlof and Kranton (2010), and Benabou and Tirole (2008)), relative status based on social comparisons (which generates envy; see, for example, Akerlof and Yellen (1990), Goel and Thakor (2005), and Mui (1995)), corporate social responsibility (e.g. Benabou and Tirole (2010)), moral behavior (e.g. Benabou and Tirole (2011)), and intrinsic motivation (e.g. Benabou and Tirole (2003)), and that these concerns influence economic behavior. Some individuals and organizations care about a sense of "higher purpose", the pursuit of something beyond wealth,[1] something "bigger than oneself". Shiller and Shiller (2011) allude to this while discussing the potential for economics to view itself as a "moral science," consistent with Haque's (2012) appeal for economics to focus on "betterness" rather than "business".

In this paper, we ask: what are the economic consequences of pursuing both traditional business goals (like shareholder value or profit maximization) and a "higher purpose"? Specifically, how are economic outcomes affected by the interaction between organizations that pursue only wealth maximization and those that pursue both wealth maximization and a higher purpose? Our interest is *not* in examining the consequences of corporate social responsibility or charitable giving. The pursuit of a higher purpose is not a goal – like charitable giving – that is distinct from generating traditional outcomes like profits and shareholder value. Rather, the pursuit of higher purpose is integrated with the pursuit of business/organizational goals, as illustrated in the quotes below:

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[1] For publicly-traded companies, the pursuit of wealth is synonymous with maximizing shareholder value. We should clarify that this should not be confused with myopic profit maximization that seeks to harvest short-term profits at the expense of long-run value maximization. Thus, when we say "profit maximization", we mean shareholder value maximization.

"Great companies must have a noble cause. Then it's the leader's job to transform that noble cause into such an inspiring vision that it will attract the most talented people in the world to want to join it." Steve Jobs, *as narrated by John Sculley*.[2]

"I was drawn by the power that savoring a simple cup of coffee can have to connect people and create community." Howard Schultz, founder of *Starbucks*.[3]

We define "higher purpose" as something that is perceived as producing a social benefit over and above the tangible pecuniary payoff that is shared by the principal and the agent. We view it as the pursuit of a goal whose eventual attainment lies *beyond* the planning horizon of the individual/organization pursuing it. Thus, the positive utility derived from pursuing the higher purpose is related to the *pursuit* itself, rather than the *outcome* of the pursuit.[4] Moreover, higher-purpose pursuit is conducted through an investment in an economic activity that also produces a tangible business outcome (wealth) within the planning horizons of those who pursue it. That is, as suggested by the quotes above, the pursuit of the higher purpose is facilitated by the pursuit of business goals and also affects business outcomes.

One can think concretely about this through examples. Imagine an entrepreneur who invests in crop technology to enhance global food production or develops a technology to seed clouds to make it rain in arid regions of the world. Such entrepreneurs may be driven both by the desire to produce wealth as well as by the desire to serve the higher purpose of feeding the world or improving the lot of those in poverty.[5] Another example is provided by a Thai company, *Cherry Blossom*, which states its higher purpose as sharing its profits with needy children and communities and promoting Buddhist teaching.[6] These are instances in which the profits/rents from an endeavor that accrue to its owners do not fully

[2] See *Bloomberg Businessweek*, October 10-16, 2011.

[3] See Kaplan (2011). Creating a business that is inspired by the higher purpose of connecting people and creating community is consistent with the notion of higher purpose we have in mind. However, pure charity is not—so the charitable work done by the *Starbucks Foundation* is outside the scope of our analysis.

[4] Later in the paper, we contrast the consequences of pursuing a higher purpose whose attainment is within the planning horizon of the principal ("short-term" higher purpose) with those of pursuing a higher purpose whose attainment lies beyond the principal's planning horizon ("long-term" higher purpose). When the consequences of the pursuit of higher purpose are within the principal's planning horizon, then the principal will care about both the pursuit of the higher purpose and its outcome.

[5] For example, Bunge, a global agribusiness firm headquartered in New York, states its "Purpose" as "To improve the global food production chain."

[6] Another example that is in the same spirit but has a somewhat different focus is Tony Hsieh, the founder of the online shoe and apparel company, Zappos, who is relocating his offices to downtown Las Vegas and also investing $350 million of his own money to buy empty lots, seed new businesses and subsidize schools to help revitalize downtown Las Vegas (see *Bloomberg BusinessWeek*, February 6-12, 2012); there are ostensibly tangible business benefits for Zappos as well from the revitalization of downtown Vegas. Similarly, Panera Bread has opened a handful of "Panera Cares" restaurants where customers can buy food and pay only what they can afford. Any profits generated are used to job-train at-risk kids. See *USA Today*, March 26, 2013.

capture the social benefits of the endeavor, and the gap between the social and private benefits is valued by the principal who pursues a higher purpose but not by a purely wealth-maximizing principal.

Higher purpose pursuit is clearly related to intrinsic motivation (e.g., Benabou and Tirole (2003)) in that one would not pursue a higher purpose unless one were intrinsically motivated to do so. However, intrinsic motivation refers merely to motivation that comes from within and does not rely on extrinsic rewards, so it can apply not only to the pursuit of higher purpose, but to any goal ─ such as profit maximization for the organization ─ that the agent would pursue in the absence of extrinsic rewards, due to innate motivation.

We develop a simple principal-agent model to explore the economic consequences of principals and agents who are driven both by the desire for wealth and the pursuit of a higher purpose, and particularly the economic consequences of the *interaction* between organizations populated by such principals and agents and those whose sole purpose is wealth maximization. As for our findings, we begin by verifying, within the context of our model, a couple of results familiar from previous research, namely that principals who pursue a higher purpose invest more capital and incur lower costs of compensating their agents than those whose sole objective is wealth maximization; see also Delfgaauw and Dur (2007), Handy and Katz (1998), Glazer (2004), and Nyborg and Brekke (2010). We then derive the main result of our analysis, which is that there may be *complementarity* in the interaction between principals pursuing higher purpose and those exclusively pursuing wealth — principals who pursue higher purpose may relax budget constraints and create additional "resources" for the purely-wealth-maximizing principals, and the presence of the purely-wealth-maximizing principals may be essential for the principals pursuing higher purpose to be able to obtain external financing. The absence of ether type of principal may lead to a market breakdown, with no projects being undertaken.

Whether an organization should pursue only wealth maximization — as, for example, in the case of a publicly-traded firm that has the goal of maximizing shareholder wealth — or also strive to achieve a higher purpose is typically viewed as a choice between competing views of how organizations should be run (e.g., see Serafeim (2013)). However, our analysis shows that there may be a potentially symbiotic relationship between those pursuing wealth maximization and those also pursuing a higher purpose.

In bringing the notion of higher purpose to the principal-agent model, we utilize perspectives from two new fields called positive psychology and positive organizational scholarship. We hope that these perspectives lend added coherence to a number of seemingly disparate ideas that all touch the same central thesis.

Positive psychology (Gilman and Seligman (1999), Snyder and Lopez (2002), and Lopez and Snyder (2009)) and positive organizational scholarship (Cameron, Dutton, and Quinn (2003), and

Cameron and Spreitzer (2012)) research focuses on what enables individuals and organizations to flourish. They shift attention from the treatment of problems to an examination of purpose, from a study of effectiveness to a study of excellence. This literature focuses on how resource constraints are overcome and performance of institutions/groups is elevated when individual behavior transcends the sole pursuit of self-interest. In this paper, we try to lend economic content to these ideas.

The rest of the paper is organized as follows. Section II surveys the related literature. Section III develops and analyzes the base model. Section IV contains an analysis of extensions of the base model to explore the potential complementarity between principals who only pursue wealth and those who also pursue a higher purpose. Section V discusses examples and applications. Section VI concludes. All proofs are in the Appendix.

II. LITERATURE REVIEW

We begin by briefly reviewing the more familiar literature in economics and then reviewing the literature in psychology and positive organizational scholarship.

There is a growing literature in economics on a variety of behaviors that do not conform to the standard model of purely-selfish profit maximization, at least in terms of *observable* outcomes. Shiller and Shiller (2011) make the case that economics should continue to integrate insights from history, psychology, and sociology to expand the boundaries of economics to include moral considerations. Benabou and Tirole (2011) develop a theory of individual and collective "moral behavior", based on a model of "identity", and use it to explain pro-social behavior. The ideas in the paper are related to the economics of identity, an area developed in a series of papers by Akerlof and Kranton (2000, 2002, 2005). Benabou and Tirole (2006) develop a theory of pro-social behavior in which a concern for reputation or self-respect leads to socially desirable behavior that can be "crowded out" by extrinsic incentives. This theme also appears in Benabou and Tirole (2003) where a model is developed that reconciles the economist's view that (extrinsic) incentives are needed for motivation with the view in psychology that such incentives undermine intrinsic motivation.[7]

These ideas are related to the increasing prominence being given to individual and corporate social responsibility as alternatives to the distributive role of markets. Benabou and Tirole (2010) shed light on this by linking individual concerns to corporate social responsibility. They contrast three distinct meanings of the term "corporate social responsibility": the adoption by firms of a more long-term perspective, the delegated exercise of pro-social behavior on behalf of stakeholders, and insider-initiated

[7] Haque (2012) argues that contemporary economic thought makes us "…prisoners of a paradigm whose linchpin is output…what really counts is seeking Ricardian profit through Fordist work in Sloanite organizations that sell Marshallian products to be mutely consumed". He goes on to suggest: "That a healthy economy isn't just one that's less dysfunctional, but one capable of scaling higher and higher peaks of optimal function".

corporate philanthropy. Of these three, the adoption of a more long-term perspective and the delegated exercise of pro-social behavior come the closest to what we have in mind with "the pursuit of higher purpose." But, as we shall see, even this analogy is imperfect.

Our work is also related to papers that address how employees (agents) and employers (principals) are matched (see Rogerson, Shiner and Wright (2005) for a review). In the labor-search literature pioneered by Diamond (1981), Mortensen (1982), and Pissarides (1985), there is a matching technology that is represented as a matching function whose arguments are the number of vacancies posted by firms and the number of unemployed workers looking for work. This leads to the endogenous determination of equilibrium wages In contrast to this approach, we take the equilibrium reservation utilities as given and assume heterogenous agents, some of whom are matched with principals who pursue only wealth maximization and some of whom are matched with principals who also pursue a higher purpose. More closely related to our notion of principal-agent matching are the papers of Van den Steen (2005, 2010), Besley and Ghatak (2005), Delfgaauw and Dur (2007), and Handy and Katz (1998). These papers show how labor-market sorting can lead employees to gravitate to firms whose principals have beliefs or private benefits similar to their own.

We turn now to the literature in psychology and positive organizational scholarship. There is a considerable literature demonstrating that if a principal enrolls an agent in a higher purpose, both the "meaning" of work (which is positively correlated with the intrinsic satisfaction from work) and the level of engagement may increase, with positive attendant consequences.

"Meaning" is related to "comprehension" and (higher) "purpose" (Steger (2009)). When related to work, "comprehension" includes the agent's capacity to recognize significant life events that can be a source of intrinsic work motivation. "Purpose" refers to higher life goals that can be connected to one's work and that give rise to passion and energy. This literature asserts (see Steger (2009)) that when people have a sense of meaning, they are happier and their privately-optimal actions are more likely to be coincident with those that benefit the organization and society. As a consequence of this, the principal and the agent may engage in a relationship of "transformative cooperation" (e.g. Sereka and Fredrickson (2010)) and "reciprocal reinforcement" (Gittel (2012)). Building on Asch (1952), Weick (2003) argues that, in such circumstances, the principal and the agent willingly depart from pure self-interest to contribute to the whole.

A higher purpose sometimes emerges when a crisis threatens the organization.[8] In other instances, a higher purpose can emerge due to the actions of "transformational leaders" (Burns (1978),

[8] In a recent interview that we conducted, the former CEO of a major chemical company gave an illustration. His company was under threat when new government regulations required that his organization publish measures of toxic emissions. When he saw the emission numbers of his company, he felt ashamed and could not even imagine

and Bass (1985)). Such leaders are able to create meaning for the agent by forging a stronger link between the business goals and the higher purpose of the organization and the agent's own comprehension and purpose (Hoffman, Bynum, Piccolo and Sutton 2011)).[9] This increases the agent's *intrinsic motivation* to exert effort, diminishing the need for an exclusive reliance on extrinsic rewards (e.g. Bono and Judge (2003), Shamir, House and Arthur (1993), Bass (1995), and Bass and Avolio (1995)).[10] While it may appear that all principals may wish to behave like transformational leaders and foster such relationships with their agents, the evidence suggests that some principals may have greater capability to attract agents to higher purpose, and thereby increase the meaning of work (Burns (1978), and Bass (1985)).[11] In other words, not all principals are inclined to enter into relationships with their agents that are guided by a higher purpose.

These observations from the empirical organization behavior literature suggest two features related to the pursuit of higher purpose that appear prominently in our model. One is that *both* the principal and the agent attach personal value or positive utility to the *inputs* they provide to the joint production process. The other is the reciprocal reinforcement aspect – due to intrinsic motivation, the agent may be willing to work hard for lower compensation and the principal may be willing to invest more than she would in the absence of the higher purpose.

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how offended outsiders would be. At the news conference, where the numbers were to be reported, he announced that in five years the company would reduce emissions by ninety percent, which far exceeded what was needed for regulatory compliance. His higher purpose came from the required process of disclosure. He was personally morally offended when he saw the numbers and made a decision to operate at a more socially responsible level. In doing so, he brought change to the organization. Employee commitment to the organization increased significantly. The CEO's emission-reduction pledge became the vision that pulled the entire company together and propelled it in a new direction. He spent little energy "managing" the effort, because the compelling vision attracted the employees to create the desired future.

[9] Barnard (1939) stated, "The inculcation of belief in the real existence of a common purpose is an essential executive function."

[10] Hackman (2002) and Kirkpatrick (2004) discuss the positive influence of higher purpose on organizational outcomes.

[11] Mahatma Gandhi, for example, spent weeks traveling with peasants, and then articulated the compelling image that India was about "bread and salt". When he did that everyone paid attention. Although simple, his message was authentic, visionary and unifying because it captured the essence of what mattered most to the common man and reflected a social value with no associated personal interest for Gandhi himself. In another of our interviews, a CEO told of a visit from Peter Drucker, who peppered the top management team with the question, "what is the purpose of your organization"? Drucker would not accept their initial responses related to profits and market share. He kept repeating the question, even when the executive grew angry. From this process came deep reflection. Eventually, a vision for the organization emerged—related to serving clients' needs—and it has successfully driven the company for decades.

III. THE BASE MODEL AND ANALYSIS

The purpose of this section is to describe the base model that will serve as the backdrop for the extensions in the sections that follow. We begin by describing the types of principals and agents in the economy, followed by a description of the types of projects and the frictions.

A. The Types of Principals

Principals are risk-neutral. There are two types of principals. Type *"N"* principals are the usual profit-maximizing principals without a sense of higher purpose guiding them. These principals care only about maximizing their expected financial wealth. Type *"H"* principals are those who care both about their expected financial wealth and the utility from investing in a project that also serves a "higher purpose," which may be expressed in non-financial terms. One way to think about this is that the project produces a social benefit that is not reflected in the pecuniary benefit of the project to the principal during her planning horizon, but the principal enjoys a utility of $\hat{\beta}$ times that social benefit, where $\hat{\beta} > 0$ for the type-*H* principal and $\hat{\beta} = 0$ for the type-*N* principal.[12]

The type-i principal maximizes:

$$E(W_i) = E(x) + \beta_i Z(I, e, \omega);\ i \in \{N, H\} \tag{5}$$

where W_i is the utility, of the type-i principal, x is her wealth, $E(\bullet)$ is the expectation operator, $\beta_H = \beta > 0,\ \beta_N = 0,$ and $Z(I, e, \omega)$ is the social value the principal perceives the project will generate, where I is the investment in the project that produces the cash flow that the principal's wealth x is based on, e is the agent's effort, and ω is the project chosen.

Thus, while the type-*N* principal's expected utility is $E(W_N) = E(x)$, the type-*H* principal's expected utility is:

$$E(W_H) = E(x) + \beta Z(I, e, \omega) \tag{5}$$

where $\beta\, Z(I, e, \omega)$ is the utility the type-*H* principal derives from a sense of higher purpose.

It is assumed that $Z(I, e, \omega) > 0$ for $\omega \in \Omega$ and $Z(I, e, \omega) = 0$ for $\omega \notin \Omega$ where Ω is the set of projects that are aligned with the principal's sense of higher purpose. For concreteness, it will be assumed that $Z(I, e, \omega) = \ell n(1 + Ie)$ for $\omega \in \Omega$.

[12] This is the classic gap between private and social benefits. If the principal operates a farm that produces a nutritious vegetable, she will care only about the profit from farming if she is a type-N principal, but will additionally care about the health benefits for consumers if she is a type-*H* principal.

Initially, it will be assumed that the principal has internal (within-the-firm) access to the capital needed for investment in the project. The implications of relying on external finance will be examined later.

An essential aspect of the higher-purpose project is that the principal *cannot* measure whether the higher purpose itself was successfully achieved during the time horizon over which the principal operates and the pecuniary project cash flows are realized. That is, Z is simply the principal's *perception* of the social benefit that investing capital I and effort e will produce over and above the pecuniary payoff x; Z cannot be contracted upon. The "reward" for pursuing the higher purpose is the pursuit itself, i.e., the principal derives positive utility from investing in the higher purpose because she perceives that it will produce a benefit to society.

To operate the project, the principal needs to hire an agent who will provide an effort input to produce project cash flow. Thus, the probability distribution of the project cash flow depends both on the capital invested by the principal and the effort provided by the agent. Thus, the principal and the agent "need" each other to pursue the higher purpose. The principal needs the agent to expend the necessary effort. The agent needs the capital investment the principal makes in order for the socially-beneficial output to be produced.

B. The Types of Agents

There are two types of agents: T_H and T_N. The T_H agents are inspired by the pursuit of a higher purpose and derive positive utility from exerting effort to achieve it. The T_N agents do not care about pursuing a higher purpose and attach no utility to it. Each agent knows his own type and for now we assume that agents are observationally identifiable by type.

The pursuit of higher purpose contributes to the type-T_H agent's utility in two ways. One is an *association benefit*. Being associated with an endeavor that has a higher purpose gives the agent a "warm glow" or sense of pride that generates a utility of $\bar{u}_H > 0$.[13] The other is a *contribution benefit*. There is a positive utility that the agent derives from expending effort that contributes to the pursuit of the higher purpose. Neither benefit is present for type-T_N agent. Both benefits will play a role in the subsequent analysis. The association benefit makes it less expensive for a type-H principal to hire a type-T_H agent than for a type-N principal to hire the same agent. That is, the association benefit plays a matching role, resulting in type-H principals being matched with type-T_H agents and type-N principals being matched with type-T_N agents. The contribution benefit will lead to lower (effort-provision) moral hazard when the

[13] Dijk and Holmen (2012) provide experimental evidence that agents' effort provision incentives become stronger when they work for an organization that announces that part of its profits will be devoted to a worthy social cause (The Red Cross) than when all profits are retained by the organization. This is also similar to our earlier example of our interview with the former CEO of a chemical company whose bold emission-reduction pledge energized his employees and created a new sense of pride in working for the company.

principal pursues a higher purpose.

The agent's reservation utility is $\bar{u}+\bar{u}_H$ if he is a type-T_H agent and $\bar{u}$ if he is a type-T_N agent, where $\bar{u}$ is the utility associated with financial wealth, and $\bar{u}_H$ is the utility related to the association benefit of the higher-purpose pursuit. That is, the type-T_H agent is associated with the pursuit of higher purpose in an alternative occupation and thus enjoys a higher utility in an alternative occupation than the type-T_N agent.

For $i \in \{N, H\}$, the type-T_i agent's utility function can be written as:

$$U_i = u(x) + \lambda_i e + a_i \bar{u}_H - V(e) \tag{5}$$

where U_i is the agent's utility, $u(x)$ is his utility over wealth, with $u(0)=0,\ u'>0,\ u''<0,\ \lambda_i = \lambda > 0$ if $i=H$ and $\lambda_i = 0$ if $i=N$, $a_i = 1$ if $i=H$ and $a_i = 0$ if $i=N$, $e \in [0,1]$ is the agent's effort, and $V(e)$ is the agent's effort disutility function with the usual properties: $V'>0,\ V''>0$ and the Inada conditions $V'(0)=0$ and $\lim_{e\to 1} V'(e) = \infty$. Here $\lambda_i e$ represents the agent's contribution-benefit utility, and $a_i \bar{u}_H$ is his participation-benefit utility. The contribution-benefit utility, $\lambda_i e$, is directly proportional to the agent's effort input *e*. Thus, when the agent chooses effort *e*, it serves a dual purpose. It contributes to the output (wealth) *x* generated by the principal-agent relationship (in a manner to be made precise shortly) and it also contributes to the pursuit of higher purpose.

This means the type-T_H agent's utility (assuming he is employed by a type-H principal) is:[14]

$$U_H = u(x) + \lambda e + \bar{u}_H - V(e) \tag{4a}$$

and the type-T_N agent's utility is:

$$U_N = u(x) - V(e) \tag{4b}$$

which is the standard utility function for an agent.

C. Project Attributes

The project requires an investment *I* at date $t=0$ and produces a payoff of $x = X(I) > 0$ ("success" denoted by *"S"*) with probability (w.p.) $pe \in [0,1]$ and *0* ("failure" denoted by "*F*") w.p. $1-pe$ at $t=2$ where $p \in [0,1]$ is a constant, *e* is the agent's effort, and $X'>0, X''<0$.

The agent's effort choice *e*, made at $t=1$, is privately observed only by the agent. The principal's investment choice, *I*, made at $t=0$, is publicly observable.

[14] The assumption here is that there is only one higher purpose that can be pursued. A more realistic situation is one in which there are multiple higher purposes from which the principal could choose and the matching process also involves finding a type-T_H agent who believes in the same higher purpose.

D. Agent's Wages

The agent's wage contract is a pair $\left\{\Phi_{S,}^{i}\Phi_{F}^{i}\right\}$ of wages paid by a type-*i* principal $\left(i \in \{H, N\}\right)$, with the agent being paid Φ_S^i if the project succeeds and Φ_F^i if it fails. Negative wages are precluded, so $\Phi_S^i \geq 0$ and $\Phi_F^i \geq 0$.

E. Sequence of Events and Time Line

At *t = 0*, the principal announces which project she will invest in and the size of the investment, *I*. She then communicates with the agent and makes the agent a take-it-or-leave-it offer of a wage contract $\left\{\Phi_S^i, \Phi_F^i\right\}$ in exchange for his services. The agent either accepts the offer and project management commences with the principal investing *I* or rejects it and the game ends.

At *t = 1*, the agent chooses his effort *e*.

At *t = 2*, the project cash flow is realized, and the principal and the agent are paid off.

Figure 1 summarizes this sequence of events.

Figure 1 goes here

E. Analysis of The First Best

We begin by observing that the agent will receive a fixed wage in this case as the principal will instruct the agent to choose a first-best effort level e^* and receive a fixed wage Φ^N regardless of the project outcome if the principal is type *N* and a fixed wage of Φ^H regardless of the project outcome if the principal is type *H*. Thus, the type-*N* principal solves:

$$\underset{I,e}{Max}\ peX(I) - \Phi^N - I \tag{5}$$

subject to

$$u(\Phi^N) - V(e) \geq \bar{u} \tag{6}$$

where (6) is the agent's individual rationality (*IR*) or participation constraint. Similarly, the type-*H* principal solves:

$$\underset{I,e}{Max}\ peX(I) - \Phi^H - I + \beta\ell n(1 + Ie) \tag{7}$$

subject to

$$u(\Phi^H) + \lambda e - V(e) + \bar{u}_H \geq \bar{u} + \bar{u}_H \tag{8}$$

where it has been assumed that the type-T_H agent is matched up with the type-*H* principal and the type-T_N agent is matched up with the type-*N* principal.[15] We can now state the following result:

Proposition 1**:** *Let* e_H^* and e_N^* *designate the first-best effort levels chosen by agents working for the type-H and type-N principals respectively, and* I_H^* *and* I_N^* *the first-best investment levels chosen by the type-H and type-N principals respectively. Then* $e_H^* > e_N^*$ *and* $I_H^* > I_N^*$.

The intuition is easy to see. The marginal return to effort for the type-T_H agent working for the type-*H* principal is higher than that for the type-T_N agent working for the type-*N* principal. Thus, the first-best effort level elicited by the type-*H* principal is higher. Moreover, this higher effort means that the marginal return to investment is also higher for the type-*H* principal. When combined with the direct utility the type-*H* principal derives from investing, we find that type-*H* principal invests more.[16]

The result that the type-H principal is able to elicit higher effort from the agent is not surprising, given the construction of the model, and it has been noted before in the literature. For example, in Glazer's (2003) model, a worker exerts extra effort because he values the output beyond the wage he earns. Similarly, in Van den Steen (2005), matching firms and employees with similar beliefs leads to higher employee effort. This result is also consistent with the experimental evidence provided by Dijk and Holmen (2012). They report that when principals announce that some of the projects will be diverted to benefit a social cause, the "warm glow" this creates induces agents to work harder than when no such transfers are made from the profits generated by the principal-agent relationship. The following lemma, while transparent in its intuition, is useful.

Lemma 1: *The type-H principal will pair up with the type-*T_H *agent and the type-N principal will pair up with the type-*T_N *agent.*

The type-*H* principal does not want a type-T_N agent because such an agent would not work as hard, given the same wage contract, as a type-T_H agent who values the pursuit of higher purpose. Similarly, the type-*N* principal does not want a type-T_H agent because such an agent has a higher reservation utility, $\bar{u} + \bar{u}_H$, than $\bar{u}$, the reservation utility of the type-T_N agent. Since the type-*N* principal cannot provide $\bar{u}_H$ by providing the agent an association benefit related to higher-purpose pursuit, she

[15] This is the efficient matching of principals and agents, as will be verified shortly. Recall that agents and principals are observationally identifiable.

[16] The reader will have noticed that $I_H^* > I_N^*$ obtains even if $\beta = 0$. Thus, the type-*H* principal need not derive any direct utility from investing in order for this result to hold. Occam's Razor would then demand that we set $\beta = 0$. However, $\beta > 0$ plays an important role later in the second-best case analysis and when type-*H* and type-*N* principals are observationally indistinguishable.

must provide $\bar{u}+\bar{u}_H$ via monetary compensation. This makes the type-T_H agent more costly than the type-T_N agent for a type-*N* principal. Note that this result holds in the first-best as well as second-best cases, so we will use it in the rest of the analysis.

Previous papers have derived similar results. For example, Delfgaauw and Dur (2007) show how wage setting by firms is designed to attract those with the highest intrinsic motivation. This kind of sorting, wherein individuals sort in and out of economic environments based on their preferences, has been verified in laboratory experiments. For example, Lazear, Malmendier and Weber (2012) demonstrate that allowing subjects to avoid environments in which sharing is possible significantly reduces sharing. That is, there are those who share "reluctantly", so given an opportunity in which they can avoid sharing, they choose to do so.

Our model assumes that the agent's type is immutable. However, as Hodgson (1996) suggests, the principal can influence the agent's type, so that pre-play communication of the higher purpose being pursued by the principal may "convert" a type-T_N agent before they agree to a contract. Hodgson (1996) argues that corporate culture, which may provide such pre-play communication, can change even the *preferences* of employees. Such preference evolution is outside our model, but may be an interesting extension to examine.

F. Analysis of the Second Best

As is well known from the standard principal-agent model, when the agent's effort choice cannot be observed by the principal, the agent will not be paid a fixed wage under the optimal second-best contract. Given the structure of the problem, it is also evident that the principal will always set $\Phi_F^i = 0$, since any positive Φ_F^i will make it more expensive for the principal to provide the necessary effort incentives. Thus, in the second-best case, the type-*N* principal solves:

$$\underset{I,\Phi_S^N}{Max}\ pe\left[X(I)-\Phi_s^N\right]-I \tag{9}$$

subject to

$$peu(\Phi_s^N)-V(e)\geq\bar{u} \tag{10}$$

$$\begin{aligned} &e\in\operatorname{argmax}\left\{peu(\Phi_s^N)-V(e)\right\} \\ &\quad e\in[0,1] \end{aligned} \tag{11}$$

where (11) is the incentive compatibility (IC) constraint for the agent's effort choice. Similarly, type-*H* principal solves:

$$\underset{I,\Phi_s^H}{Max}\ pe\left[X(I)-\Phi_s^H\right]+\beta\ell n(1+Ie)-I \tag{12}$$

subject to

$$peu(\Phi_s^H) + \lambda e - V(e) \geq \bar{u} \tag{13}$$

$$\begin{aligned} & e \in \operatorname{argmax}\left\{ peu\left(\Phi_s^H\right) + \lambda e - V(e) \right\} \\ & e \in [0,1] \end{aligned} \tag{14}$$

The solutions to these second-best problems are summarized in the result below.

Proposition 2: *Let e_H and e_N represent the second-best effort choices of the type-T_H and type-T_N agents respectively, and I_H and I_N be the second-best investment levels of the type-H and type-N principals respectively. Then, the optimal (second-best) wage contracts are:*

$$\Phi_s^N = \Psi\left(\frac{\bar{u} + V(e_N)}{pe_N} \right) \tag{15}$$

$$\Phi_s^H = \Psi\left(\frac{\bar{u} + V(e_H) - \lambda e_H}{pe_H} \right) \tag{16}$$

where $\Psi \equiv u^{-1}$, $e_H = e_N$ and $\Phi_s^H < \Phi_s^N$ .Moreover, $\Phi_F^H = \Phi_F^N = 0, I_H > I_N$ and the type-H principal enjoys a higher expected utility than the type-N principal in equilibrium.

To understand the economic intuition, let us begin by noting that the moral hazard induced by effort aversion is lower with the type-T_H agent, who is employed by the type-*H* principal, than with the type-T_N agent, who is employed by the type-*N* principal. Because the type-T_H agent values his effort input to the pursuit of the higher purpose chosen by the principal, he works harder for any given success-state wage Φ_S. Since the type-T_H agent's utility from pursuing a higher purpose is linear in effort, the interplay of the IR and IC constraints is such that the optimal solution involves *lowering* the type-T_H agent's wage below that of the type-T_N agent to elicit the *same* effort choice.[17] This is because the linearity of λe in *e* means that the marginal benefit of inducing higher effort by keeping the wage the same as that of the type-T_N agent is exactly offset by the marginal benefit of lowering the wage enough to induce the same effort as the type-T_N agent. In this case, the relative benefit to the type-*H* principal comes in the form of a lower wage for the agent compared to what the type-*N* principal has to pay. The type-*H* principal also invests more than the type-*N* principal for reasons similar to those discussed in connection with the first best. Note that this is the "reciprocal reinforcement" aspect of pursuing a higher purpose that was discussed in Section II (e.g. Hoffer Gittel (2012)). The agent is willing to put in the required

[17] This result is an artifact of the specific way in which the type-T_H agent attaches value to the higher purpose. There are more complex specifications in which the type-T_H agent works harder than the type-N agent, as in the first-best case, for the same wage.

effort for less compensation and the principal is willing to invest more capital.[18] The result that the principal invests more when motivated by a goal that transcends profits has also been derived previously, albeit in different model settings; see Glazer (2004) and Nyborg and Brekke (2010).

The result that the principal can elicit effort from the agent at a lower cost is a key economic benefit to the principal of pursuing a higher purpose that is integrated with the pursuit of the business itself. This can be viewed as an economic interpretation of the "transformative cooperation" described by Sereka and Fredrickson (2010). It is a result that has been derived previously in the context of self-selection-with-asymmetric-information models. For example, Handy and Katz (1998) show that lower wages in nonprofits may be designed to generate trust by inducing self-selection in employees. Nyborg and Brekke (2010) develop a model in which wages are kept low to keep shirkers out of jobs in which it is valuable to employ those who have a preference for being important to others.

The result that the type-*H* principal enjoys a higher expected utility in equilibrium than the type-N principal is intuitive, and it provides a possible explanation for why entrepreneurs are willing to invest in ventures that appear to provide too low an expected return for the amount of risk being borne. This finding has been empirically documented (see Moskowitz and Vissing-Jorgensen (2002)). Because they enjoy a higher expected utility from the same project than their "rational", profit-maximizing (type-*N*) counterparts, the type-*H* principals may be willing to jump in where the type-*N* principals fear to tread. This is a result we shall revisit in a different context later in the analysis.

IV. EXTENTION OF THE BASE MODEL: RESOURCE CREATION, OVERINVESTMENTS AND MARKET BREAKDOWNS

In this section we explore extensions of the base model in two directions. In both extensions the focus is on examining the *interactions* between type-*H* and type-*N* principals, and the ramifications of this for the occurrence (or prevention) of market breakdowns. In the first extension, we show how not having enough type-*H* principals can cause a market breakdown and no investments in projects. In the second extension we show how not having enough type-*N* principals can cause a market breakdown. We then join these two analysis and show in an integrated setting that insufficiency of either type-*H* or type-*N* principals can cause a market breakdown.

A. The Pursuit of Higher Purpose and the Creation of Resources

Individuals and organizations operate with budget constraints. In this subsection we point out that principals who pursue a higher purpose may help to relax the budget constraints of *other* principals by *creating* new resources for them. Absent these new resources, the market for investing in projects

[18] This is because there is a synergy between the type-*H* principal and the type-T_H agent that is built into the model. The principal's higher-purpose pursuit reduces the agent's effective marginal cost of effort. For another approach to effort-cost synergies in a principal-agent setting, see Edmans, Goldstein and Zhu (2011).

breaks down. A simple illustrative extension of the base model is developed below to give legs to this idea.

Imagine that at date $t = 0$, a principal can invest in a single-period "exploratory" or R&D project that requires a fixed investment *I* at $t = 0$. If the principal makes this investment, the agent chooses his effort *e* also at $t = 0$, and the project payoff is realized at $t = 1$. This payoff is $X \; w.p. \; qe$ and $0 \; w.p. \; 1 - qe$ where $q \in (0,1)$. Either a type-*N* or a type-*H* principal could invest in this project.

Suppose now that a type-*N* principal has knowledge that would allow her to invest in a project at $t = 1$ that will produce a payoff at $t = 2$. However, for this second-period project to have any value, the exploratory first-period project must be first undertaken *and* be successful. That is, the second-period project will have no value if there is no investment in the first-period project or that project fails.[19]

Examples of such sequential linkages are easy to think of. A company may have knowledge that can be translated into new software. However, because the new software will not run effectively on existing computers, this knowledge is useless unless some company develops and introduces to the market a faster computer with more memory *and* consumers show a willingness to purchase this computer (i.e., the project of introducing the computer is successful). Another example is a company that has the technology to produce car batteries that run on solar power, but this knowledge can be put to use only if a car manufacturer is willing to invest in solar-powered cars and consumers are willing to buy them.

Will a type-*N* principal be willing to invest in this exploratory project at $t = 0$? In the analysis that follows, this question is examined.

Stand-alone value of the first-period project to the type-N principal: If we ignore the "learning" benefit of the first period project for the second-period project, and ask whether the stand-alone value of the first-period project is sufficient to warrant the investment of *I*, then the type-*N* principal solves:

$$\underset{\Phi_s^N}{Max}\, qe\left\{X - \Phi_S^N\right\} - I \tag{17}$$

subject to

$$qeu(\Phi_s^N) - V(e) \geq \bar{u} \tag{18}$$

$$\begin{aligned} &e \in \operatorname{argmax}\left\{qeu(\Phi_s^N) - V(e)\right\} \\ &\quad e \in [0,1] \end{aligned} \tag{19}$$

[19] For simplicity, it is assumed that only type-*N* principals have the skills to invest in the second-period project. One could think of the type-*N* principals as companies that have both entrepreneurial capabilities (first-stage-project skills) and the skills to invest in downstream (second-period) projects and type-*H* principals as entrepreneurs.

Let $\hat{\Phi}_s^N$ represent the optimal solution to this problem and $\hat{e}_N$ the agent's choice of effort in the response to $\hat{\Phi}_s^N$. Then, we know $\hat{e}_N$ satisfies:

$$V'(\hat{e}_N) = qu(\Phi_s^N) \tag{20}$$

and $\hat{\Phi}_s^N$ is:

$$\hat{\Phi}_s^N = \Psi\left(\frac{V(\hat{e}_N) + \bar{u}}{q\hat{e}_N}\right) \tag{21}$$

Equations (20) and (21) are solved simultaneously to obtain $\hat{e}_N$ and $\hat{\Phi}_S^N$. The type-*N* principal's expected equilibrium utility with the exploratory project is:

$$E(\hat{W}_N) = q\hat{e}_N\left\{X - \hat{\Phi}_s^N\right\} - I \tag{22}$$

where $\hat{e}_N$ and $\hat{\Phi}_s^N$ are the solutions described above. Let us assume that:

$$q\hat{e}_N\left\{X - \hat{\Phi}_s^N\right\} < I, \tag{23}$$

so the type-*N* principal would not invest in the exploratory project based on its stand-alone value.

Note, however, that investing in the exploratory project leads to learning about the second-period project. If the first-period exploratory project is successful, then the second-period project is good. The good project leads to a payoff of $X_1(I)$ at $t = 2$ on an investment of *I* at $t = 1$. If there is no investment in the exploratory project or if the exploratory project fails, then the second-period project is bad and generates a payoff of zero w.p.1.

Value of Second-Period Project to type-N principal: Let us assume that only the type-*N* principal has the knowledge to extract value from the second-period project. This principal solves the following second-period problem:

$$\underset{\Phi_s^N, I}{Max}\ pe\left\{X_1(I) - \Phi_s^N\right\} - I \tag{24}$$

subject to

$$peu(\Phi_s^N) - V(e) \geq \bar{u} \tag{25}$$

$$\begin{aligned} &e \in \operatorname{argmax}\left\{peu(\Phi_s^N) - V(e)\right\} \\ &\quad e \in [0,1] \end{aligned} \tag{26}$$

Let $\bar{\Phi}_S^N$ and $\bar{I}_N$ represent the optimal solutions to this problem, and $\bar{e}_N$ the agent's optimal effort choice. The type-*N* principal's expected utility from this project is

$$E(\bar{W}_N) = p\bar{e}_N \left\{ X_1(\hat{I}_N) - \bar{\Phi}_s^N \right\} - \bar{I}_N \tag{27}$$

Assume that $E(\bar{W}_N) > 0$.

Value of the first-period project to the type-N principal taking learning value into account: Thus, if the type-*N* principal takes into account the learning value of the exploratory project, then in deciding whether to invest in the exploratory project, she solves the following first-period problem:

$$\underset{\Phi_s^N}{Max}\, qe\left\{ X - \Phi_s^N + E(\bar{W}_N) \right\} - I \tag{28}$$

subject to

$$qeu(\Phi_s^N) - V(e) \geq \bar{u} \tag{29}$$

$$\begin{aligned} &e \in \operatorname{argmax}\left\{ qeu(\Phi_s^N) - V(e) \right\} \\ &\quad e \in [0,1] \end{aligned} \tag{30}$$

The agent's choice of effort satisfies:

$$V'(\bar{\bar{e}}_N) = qu(\bar{\bar{\Phi}}_s^N) \tag{31}$$

And $\bar{\bar{\Phi}}_s^N$ is:

$$\bar{\bar{\Phi}}_s^N = \Psi\left(\frac{v(\bar{\bar{e}}_N) + \bar{u}}{q\bar{\bar{e}}_N} \right) \tag{32}$$

Since (31) and (32) are identical in functional form to (20) and (21), this solution is identical to the solution which treats the exploratory project as a stand-alone project. Hence, the value of the exploratory project to the type-*N* principal, taking into account its second-period learning benefit, is:

$$E(\bar{\bar{W}}_N) = q\hat{e}_N \left\{ X - \hat{\Phi}_s^N + E(\bar{W}_N) \right\} - I \tag{33}$$

Let us assume that

$$q\hat{e}_N \left\{ X - \hat{\Phi}_s^N + E(\bar{W}_N) \right\} < I \tag{34}$$

which makes (23) redundant and guarantees that the type-*N* principal will *not* invest in the exploratory project.

Values of the first-period and second-period projects to the type-H principal: Since the type-*H* principal is assumed to lack the knowledge to extract any value from the second-period project,[20] she invests in the exploratory project in the first period only if its stand-alone value warrants it.
Thus, she solves:

[20] Alternatively, this could be viewed as a situation in which there is a relative scarcity of type-*H* principals to invest in second-period projects. This is because the focus of the analysis is on the value created by type-*H* principals because of their willingness to invest in exploratory first-period projects.

$$\underset{\Phi_s^H}{Max}\ qe\left\{X-\Phi_s^H\right\}-I+\beta\ell n(1+Ie) \tag{35}$$

subject to

$$qeu(\Phi_s^H)+\lambda e-V(e)\geq\bar{u} \tag{36}$$

$$\begin{aligned} &e\in\operatorname{argmax}\left\{qeu(\Phi_S^H)+\lambda e-V(e)\right\} \\ &\quad e\in[0,1] \end{aligned} \tag{37}$$

Let $\hat{\Phi}_s^H$ represent the optimal solution to this problem, and $\hat{e}_N$ the optimal choice of effort by the agent. We now have the following result:

Proposition 3: *When (34) holds and there are no type-H principals, the market for first-period and second-period projects fails in the sense that there is no investment in either project. However, if there are type-H principals, then there exist* β *and* λ *high enough such that the type-H principal will invest in the exploratory project in the first period even when (34) holds and the type-N principal eschews that project. The presence of the type-H principal thus creates an additional resource of* $q\hat{e}_H E(\bar{W}_N)>0$ *for the type-N principal and increases social welfare.*

Essentially, the type-*N* principal's knowledge pertaining to the second-period project creates a *real option* that is worthless absent the type-*H* principal. There is market failure because of lack of investment in the exploratory project. The type-*H* principal's willingness to invest in the exploratory project is what gives this real option value, and this value is $q\hat{e}_H E(\bar{W}_N)$. Thus, type-H principals can generate positive externalities for *other* principals, in the form of spillover benefits that go beyond the boundaries of the organization led by the type-*H* principal. The creation of this "resource" for the type-*N* principal also relaxes this principal's budget constraint at *t=0*. This is because, conditional on the type-*H* principal investing in the exploratory project at *t=0*, the type-*N* principal can issue claims against the now-valuable real option she has on the second-period project (which is worth $q\hat{e}_H E(\bar{W}_N)$) and raise additional external finance at *t=0*. Market failure can thus be avoided and welfare enhanced by presence of the type-*H* principal.

B. External Financing and the Role of Type-*N* Principals

Until now, we have assumed that the principal does not need any external financing to invest in projects. Suppose now that no internal funds are available and all financing must be raised by issuing equity claims to investors against the future cash flows of the project.[21] Investors are risk neutral, operate in a perfectly competitive capital market and require an expected return of zero to participate. In the

[21] Equity is just for simplicity. The analysis is qualitatively unchanged if debt is used.

context of the analysis in the previous subsection, we can think of the exploratory project as being internally financed and the project being considered here as the second-period project for which external financing must be raised.

Before diving into the details of the model, let us explain the thoughts we wish to express with the analysis in this subsection. Up to this point, it appears as if the type-*H* principals are unambiguously preferred from a social welfare standpoint. They invest more capital and inspire their agents to work harder than the type-*N* principals, and they may additionally create resources for the type-*N* principals. What we wish to examine in this section is a *positive* (in the sense of welfare enhancement) role for the type-*N* principals. We will do this by exploiting the simple fact that, because the type-*H* principals are willing to invest when the type-*N* principals are not, it is also possible that the type-*H* principals will wish to invest even when investors do not wish to. This possibility can result in external financing being choked off for all type-*H* principals if investors cannot themselves observe the state of nature in which they would like to avoid investing. The presence of type-*N* principals can allow investors to learn when this state of nature has occurred, and thereby condition their financing on this learning. This, in turn, can open the external financing spigot again for the type-*H* principals. The model extension developed below attempts to capture this central idea.

Two types of projects: Imagine a three-date world in which principals are observationally *identifiable* by type and agents' effort choices are only privately observed by the agents themselves. That is, agents and investors know the types of the principals when those principals are raising financing. At date *t=0*, the principal observes whether she has a project available to invest in. The probability of project availability is $\gamma \in (0,1)$, and project availability is independent and identically distributed (i.i.d) across principals. If a project is available, it requires a fixed investment of *I* at t=1. There is a common state of nature which determines whether the projects of *all* principals are good or bad. This state of nature is realized at *t*=1, and it is only after the realization of this state that each principal decides whether to raise external financing for the project and hire an agent. This state of nature can be described as follows. W.p. $\delta \in (0,1)$, the state of nature will be "favorable" and all projects will be "good." A good project generates a payoff of X w.p. pe and zero w.p. $1-pe$ at *t=2*, where $pe \in [0,1]$ and $pX > I$. W.p. $1-\delta$, the state of nature will be "unfavorable" and *all* projects will be bad. A bad project generates a payoff of X w.p. re and a payoff of zero w.p. $1-re$ at *t=2*, where $r \in (0, p)$. It is assumed that each principal privately observes the realization of this state of nature but the agent and investors do not.

External financing of project: The principal has no internal funds for investment and must raise the necessary *I* by issuing equity claims to investors that give up ownership $\alpha \in [0,1]$ of the value of the firm at *t=2*. The firm has assets in place worth *A*, and the equity claims sold to investors represent

ownership α of the sum of the project cash flow at *t=2* and the assets in place. We assume the expected value of the bad project, $rX < A$. There are *M* type- N principals and this fact is common knowledge. The sequence of events is depicted in *Figure 2*.

Figure 2 goes here

When will the type-N principals invest? The first-best case with full information about the realization of the state of nature: We will first establish sufficiency conditions for the type-*N* principals to invest when the state of nature is favorable and not invest when it is unfavorable in the first-best case in which the agent and the investors know whether the state realization is favorable or unfavorable. Suppose first that the unfavorable state is realized. If the type-*N* principal decides to raise external financing, then she solves the following problem:

$$\underset{\Phi_s^N,\, \alpha \in [0,1]}{Max} \; [1-\alpha]\left\{re\left[X - \Phi_s^N\right] + A\right\} \tag{38}$$

subject to

$$re\,u(\Phi_s^N) - V(e) \geq \bar{u} \tag{39}$$

$$\begin{aligned} &e \in \operatorname{argmax}\left\{reu(\Phi_s^N) - V(e)\right\} \\ &\quad e \in [0,1] \end{aligned} \tag{40}$$

$$\alpha\left\{re\left[X - \Phi_s^N\right] + A\right\} = I \tag{41}$$

The only new constraint is (45), which says that the participation constraint of the investors, who provide *I* in financing in exchange for α ownership of the firm, must be satisfied. Suppose now that

$$rX + A < I. \tag{42}$$

Then it is apparent that investors would be unwilling to provide financing if they knew that the unfavorable state had occurred. That is, α will need to exceed 1, which violates the feasibility constraint.

Now suppose the favorable state has occurred. Then the type-*N* principal solves the same problem as in (38) – (41) except that *r* is replaced by *p*. Since $pX > I$, it is clear that investors will be willing to provide financing if they know the favorable state has occurred, as long as the cost of compensating the agent for effort is not too high.

The Second-best case in which agents and investors do not observe the state realization the principal observes: Now suppose the type-*N* principal goes to the market to raise external financing even though the unfavorable state has occurred, and neither the investors nor the agent can observe which state has occurred. In this case, the principal will solve the problem in (38) – (41), but (45) will be replaced by

$$\alpha\left\{[\delta p+[1-\delta]r]e[X-\Phi_s^N]+A\right\}=I \tag{43}$$

and in (39) and (40), r is similarly replaced by $\delta p+[1-\delta]r\equiv\hat{r}$. Note that, since the state is unobservable to the agent, the principal offers the same wage contract, Φ_s^N, to the agent regardless of the state, and the agent's effort choice, e, is also independent of the unobservable state.

Let the optimal contract for the agent, $\tilde{\Phi}_s^N$, and the agent's optimal choice of effort, $\tilde{e}_N$, be the second-best solution that maximizes (38), subject to (39) and (40) with r replaced by $\hat{r}$. Let $\tilde{\alpha}_N$ be the solution, given $\tilde{\Phi}_s^N$ and $\tilde{e}_N$, that satisfies (43), and assume that (43) can be satisfied with some $\tilde{\alpha}_N\in(0,1)$. The type-N principal's expected utility, conditional on the state being unfavorable, can be written as $[1-\tilde{\alpha}_N]\left\{r\tilde{e}_N\left[X-\tilde{\Phi}_s^N\right]+A\right\}$. Now it is easy to verify that if

$$\tilde{\alpha}_N\left[1-\tilde{\alpha}_N\right]^{-1}>r\tilde{e}_N\left[X-\tilde{\Phi}_s^N\right][A]^{-1} \tag{44}$$

then the type-N principal's expected utility from investing in the project conditional on the realization of the state of nature being unfavorable (recall that the principal can observe the state realization) will be less than A, her expected utility if she abstains from investing. Note that (43) implies that a *ceteris paribus* increase in I will increase α, and the limit of $\tilde{\alpha}_N[1-\tilde{\alpha}_N]^{-1}$, as $\tilde{\alpha}_N$ goes to 1, is infinity, so for I large enough, (44) will hold since the right-hand side of (44) is bounded. As long as (44) holds, the type-N principal will not raise external financing when the state of nature is unfavorable.

The next question is: what will the type-H principal do? Assume first that the type-N principals are absent and investors believe that the type-H principals will seek financing even when the state of nature is unfavorable. Then, conditional on the unfavorable state having occurred, the type-H principal solves:

$$\underset{\Phi_s^H,\alpha\in[0,1]}{Max}\quad[1-\alpha]\left\{re\left[X-\Phi_s^H\right]+A\right\}+\beta\ell n(Ie) \tag{45}$$

subject to

$$reu(\Phi_S^H)+\lambda e-V(e)\geq\bar{u} \tag{46}$$

$$\begin{aligned}&e\in\operatorname{argmax}\left\{reu(\Phi_s^H)+\lambda e-V(e)\right\}\\&\quad e\in[0,1]\end{aligned} \tag{47}$$

$$\alpha\left\{[\hat{r}]e\left[X-\Phi_s^H\right]+A\right\}=I \tag{48}$$

where we maintain the second-best-case assumption is that the investors and the agent are unable to determine whether the state is favorable or unfavorable.

Let $\tilde{\Phi}_s^H$ and $\tilde{\alpha}_H$ the principal's optimal solutions to (45) – (48) and $\tilde{e}_H$ the agent's optimal choice of effort, given the optimal contract. We know from our previous analysis that $\tilde{e}_H > \tilde{e}_N$. The following result is useful to note.

Lemma 2: *The type-H principal's expected utility, (45), evaluated at the optimal values,* $\tilde{\Phi}_S^H, \tilde{\alpha}_H, \tilde{e}_H$, *exceeds the type-N principal's expected utility (38), evaluated at the optimal values,* $\tilde{\Phi}_S^N, \tilde{\alpha}_N, \tilde{e}_N$.

This result is similar to Proposition 2. Its main import here is that it suggests that there will exist exogenous parameter values such that the type-*N* principal will avoid seeking external financing when the state of nature is unfavorable, but the type-*H* principal will seek such financing, assuming that investors are willing to provide it. This now leads to the main result of this section:

Proposition 4: *There exist exogenous parameter values (including M sufficiently large), such that, in the absence of the type-N principals, type-H principals will wish to obtain external financing at t=1 regardless of the realized state of nature, and investors will never provide the financing, thereby causing a market breakdown. However, when the type-N principals are also in the market, external financing will be available to all principals as long as one or more type-N principals are seeking financing, and it will be available to no principals if there are no type-N principals seeking financing. The presence of the type-N principals thus prevents a market breakdown and improves welfare.*

This proposition provides formal structure to the ideas described earlier in this subsection. Specifically, it is the principals who are motivated purely by wealth maximization that sound the warning bell that the realization of the state of nature is adverse and investment should be avoided. Their behavior provides investors with the assurance they need that when the state of nature is unfavorable, they will be able to avoid providing funds. They cannot rely on the type-*H* principals to sound the warning bell, so absent the type-*N* principals, investors would end up funding projects even when the state of nature is unfavorable, and anticipating this, they would not provide funding at all. This means financing would be unavailable to the type-*H* principals even if the realized state of nature is favorable. The market thus breaks down. The type-*N* principals are valuable because their actions generate an informative signal about the state of nature,[22] thereby preventing market failure by creating the "investment discipline" that investors need to be willing to provide funds.[23] This increases welfare.

[22] The proof relies on *M*, the number of type-*N* principals, being large enough. Since project availability is uncertain, type-*N* principals may not be seeking financing regardless of whether the state is favorable or unfavorable. However, when *M* is sufficiently large, then the i.i.d. nature of project availability means that the absence of any type-*N* principal in the external financing market makes it highly probably that the unfavorable state has occurred.

[23] Although this is a bit of a stretch, in the context of the organization-behavior literature, we could view the type-*H* principals as those emphasizing "positivity" – focused on positive emotions like joy, gratitude, and hope, all inspired by a sense of higher purpose – and the type-*N* principals as those emphasizing "negativity" (e.g. Frederickson 2009).

C. The Possible Essentiality of Type-*H* and Type-*N* Principals to Prevent Market Breakdowns

The analysis of the previous two subsections can be joined together to generate a rationale for having both type-*H* and type-*N* principals in that a market failure would occur if *either* type was absent. To see this, consider a setting with two time periods and three dates: $t=0,1,2$. The first period begins at $t=0$ and ends at $t=1$, and the second period begins at $t=1$ and ends at $t=2$. There are type-*H* and type-*N* principals in period 1 and also in period 2. To keep things simple, suppose that a given principal exists only in one period and can thus invest only in the project available in that period. Thus, there are first-period type-*H* and type-*N* principals and second-period type-*H* and type-*N* principals.[24]

At $t=0$, a principal can invest in a single-period "exploratory" or R&D project that requires a fixed investment of I. If the principal makes this investment, the agent chooses his effort e also at $t=0$, and the project payoff is realized at $t=1$. As in Section IVA, this payoff is $X \ w.p.\ qe$ and $0\, w.p. 1-qe$, where $q \in (0,1)$. This first-period project is available to all type-*H* and type-*N* principals.

Corresponding to each exploratory project, there is a "downstream" second-period project whose value depends on the outcome of the exploratory project. If the exploratory project succeeds, then the state of nature for the downstream project will be "favorable" and the project will be "good". As in Section VB, a good project generates a payoff of $X \ w.p. pe$ and zero $w.p.\ 1-pe$, where $p \in [0,1]$. If there is no investment in the exploratory project *or* if it fails, then the state of nature for the downstream project will be "unfavorable" and the project will be "bad". A bad project generates a payoff of zero $w.p. 1$. It is assumed that each principal who has available a second-period project privately observes whether there was investment in the first-period project and whether it succeeded or failed, but the agent and investors do not know whether investment occurred, and if it did occur, whether the project succeeded. That is, only the principal associated with a specific downstream project observes whether the exploratory project relevant to that downstream project succeeded or not; no one else does. Let $\delta \in (0,1)$ be the probability of the favorable state as assessed by an agent or an investor in the second period. Clearly, δ will be an outcome of the equilibrium as it pertains to first-period investments.

In the second period, the principal has no internal funds for investment and must raise the necessary I by issuing equity claims to investors that give up ownership $\alpha \in [0,1]$ of the value of the firm at $t=2$. The firm has assets in place worth A, and the equity claims sold to investors represent ownership α of the sum of the project cash flow at $t=2$ and the assets in place.

What the analysis in this section shows is that negativity may be essential. This is consistent with Fredrickson's (2009) observation: "Negativity is important. Nobody can flourish without it."

[24] Given the analysis in Section V A, it is easy to see how we could permit a given principal to invest in projects in both periods.

There are multiple projects in each period. However, while an agent knows the type of the principal he is paired up with, investors do not know whether the principal in any period is type-*H* or type-*N*. That is, the contract the principal gives to the agent is also unobservable to investors. The probability that a first-period principal is type-*H* is $h_1 \in (0,1)$, and the probability that a second-period principal is type-*H* is $h_2 \in (0,1)$. These prior beliefs are commonly shared.

Analysis of the First-Period Project: This analysis is similar to the analysis of the stand-alone value of the first-period project in Section IVA. If (23) is satisfied, no type-*N* principal will invest in the project. The analysis for the type-*H* principal is also similar to the analysis in Section IVA since the type-*H* principal in that analysis was assumed to be incapable of investing in the second-period project. As in Proposition 3, if β and λ are assumed to be high enough, then the type-*H* principal will invest in the exploratory project.

Analysis of the Second-Period Project: As in Section IVB, assume that (42) holds, so investors will be unwilling to provide financing if they know that the unfavorable state has occurred. In the second-best case, the type-*N* principal solves the following problem, taking as a given that a share α of ownership must be surrendered to raise *I*, and the favorable state has occurred.

$$\underset{\Phi^N,\, \alpha \in [0,1]}{Max}\ [1-\alpha]\left\{ pe\left[X - \Phi^N \right] + A \right\} \tag{49}$$

subject to

$$peu\left(\Phi^N\right) - V(e) \geq \bar{u} \tag{50}$$

$$\underset{e \in [0,1]}{e \in \arg\max} \left\{ peu\left(\Phi^N\right) - V(e) \right\} \tag{51}$$

$$\alpha\left[\xi\left[X - \Phi^N \right] + A \right] = I \tag{52}$$

where ξ is the probability of success of the second-period project as computed by investors in a Nash equilibrium in which they conjecture that: (i) a type-*N* principal will invest in the second-period project only in the favorable state, and (ii) a type-*H* principal will invest in the second-period project in both states. This conjecture will be verified as a part of the Nash equilibrium. Assume $\xi X < A$. Let the optimal solution to the above program be $\left\{\hat{\Phi}^N, \hat{e}_N\right\}$ so the type-*N* principal's expected utility in the favorable state is:

$$EU_f^N = \left[1-\alpha(\xi)\right]\{p\hat{e}_N\left[X - \hat{\Phi}^N \right] + A] \tag{53}$$

Note that the contract offered to the agent and the agent's effort choice are not dependent on whether the state is favorable or favorable.

$$p\hat{e}_N\left[X-\hat{\Phi}^N\right]>\alpha(\xi)\left[1-\alpha(\xi)\right]^{-1}A \tag{54}$$

so the expected utility of the type-*N* principal is higher with external financing than it is with rejecting the second-period project and avoiding financing even when the state is favorable.

It is clear that the type-*N* principal would never wish to invest in the second-period project if the unfavorable state occurs, since her expected utility would be $[1-\alpha]A$, which is clearly less than A, the utility if no external financing is raised and the project is rejected.

The type-*H* principal solves a similar problem in the favorable state:

$$\underset{\Phi^H,\alpha\in[0,1]}{Max}\ [1-\alpha]\left\{pe\left[X-\Phi^H\right]+A\right\}+\beta\ell n(Ie) \tag{55}$$

subject to

$$peu\left(\Phi^H\right)+\lambda e-V(e)\geq\bar{u} \tag{56}$$

$$\begin{aligned} &e\in\arg\max\left\{peu\left(\Phi^H\right)+\lambda e-V(e)\right\}\\ &\quad e\in[0,1]\end{aligned} \tag{57}$$

and (52).

Let the optimal solution to this problem be $\left\{\hat{\Phi}^H,\hat{e}_H\right\}$. The type-*H* principal's expected utility at this optimum is:

$$EU_f^H=\left[1-\alpha(\xi)\right]\left\{p\hat{e}_H\left[X-\hat{\Phi}^H\right]+A\right\}+\beta\ell n\left(I\hat{e}_H\right) \tag{58}$$

We know from Lemma 2 that

$$EU_f^H>EU_f^N \tag{59}$$

Now in the unfavorable state, if the type-*H* principal offers a different contract, say $\left\{\Phi^H\right\}$, the agent will be able to infer the state. Since any success-contingent wage (different from $\hat{\Phi}^H$) has no value to the agent when the agent associates the unfavorable state with that wage, the principal will offer a fixed wage W_H and the agent's effort will satisfy the incentive compatibility (IC) condition:

$$V'(e_H)=\lambda \tag{60}$$

and W_H is chosen to ensure the agent's participation:

$$\lambda e_H-V(e_H)+W_H=\bar{u}$$

i.e.

$$W_H = \bar{u} - \lambda e_H + V(e_H) \tag{61}$$

Assume that

$$\beta \ell n(I\hat{e}_H) > \beta \ell n(Ie_H) - [1-\lambda]W_H \tag{62}$$

So the type-*H* principal would prefer to offer Φ^H even in the unfavorable state. Anticipating this, the agent will view the probability of success of the second-period project as $e\delta p$.

Let $\left\{\hat{\hat{\Phi}}^H, \hat{\hat{e}}_H\right\}$ be the optimal solution for the type-*H* principal in the Nash equilibrium in which she offers the same contract to the agent in both states and the agent use $e\delta p$ as the probability of success of the second-period project; this solution has the agent being paid a success-contingent wage of $\hat{\hat{\Phi}}^H$ and no fixed wage. Assume that:

$$\beta \ell n\left(I\hat{\hat{e}}_H\right) > \alpha(\xi)A \tag{63}$$

so the type-*H* principal will choose to raise external financing even in the unfavorable state.
Assume that

$$h_2 p\hat{\hat{e}}_H\left[X - \hat{\hat{\Phi}}^H\right] + [1-h_2]\, p\hat{e}_N\left[X - \hat{\Phi}^N\right] + A > I \tag{64}$$

$$qe_H^1\left\{p\hat{\hat{e}}_H\left[X - \hat{\hat{\Phi}}^H\right]\right\} + A < I \tag{65}$$

where e_H^1 is the effort chosen by a type-T_H agent on an exploratory project in the first period. Note that qe_H^1 is the success probability of the exploratory project when undertaken in the first period by a type-*H* principal. Thus, (64) says that investors would provide financing in the second period if they could be sure that the favorable state had occurred. And (65) says that investors would not provide financing in the second period if all they knew was that the exploratory project had been undertaken in the first period; recall that only a type-*H* principal undertakes the project. We now have

Proposition 5: *Given (64) and (65), there exist critical values of the prior beliefs about the probability of a type-H principal in each period,* $h_1^*, \in (0,1), h_2^* \in (0,1)$, *such that the market for second-period project investment is viable only for values of* (h_1, h_2) *in* $(h_1^*, 1) \times (0, h_2^*)$. *If* $(h_1, h_2) \notin (h_1^*, 1) \times (0, h_2^*)$, *then the market for second-period project investment breaks down and no external financing for the project is available.*

This result says that a market breakdown — resulting from a shutting down of the market for external finance — can occur in the second period for one of two reasons. One is that the prior probability

of type-*H* agents in the first period is *too low*. In this case, the probability that any exploratory projects were invested in and succeeded is too low. This generates too low a probability of the favorable state for the investors to be able to break even on the external financing provided for the *second-period* projects.

The other way a market breakdown can occur is if the prior probability of the type-*H* principal in the second period is *too high*, i.e., if the probability of type-*N* principals is too low. This is because a sufficiently high probability of type-*H* principals in the second period means such a high probability of investment in the unfavorable state that investors are unwilling to provide financing for the second-period project.

Thus, integrating insights of the previous two sections, we see that a market breakdown can occur if the probability of a type-*H* principal *or* the probability of a type-*N* principal is too low. That is, *both* types of principals are needed for the market to not break down. This implies that there is *complementarity rather than competition* between these two views ─ the exclusive pursuit of wealth and the joint pursuit of wealth and higher purpose ─ of the capital allocation process.

V. EXAMPLES AND APPLICATIONS

In this section, we discuss a few applications of the analysis. We make no pretense to be exhaustive. We discuss a few of the applications that seem to flow most readily from the analysis.

A. Entrepreneurship

It is interesting that not only do entrepreneurs take risks that, on average, do not generate returns that justify the risks, as documented by Moskowitz and Vissing-Jorgensen (2002), but that they apparently see opportunities that others miss. The example of Howard Schultz, the founder of Starbucks, is legendary in this respect.[25] Schultz joined Starbucks in 1982 at the age of 29 as head of marketing. At the time, Starbucks was a specialty coffee bean store in Seattle. The next year Schultz, while attending a trade show in Italy, discovered numerous espresso bars and the associated "Continental subculture" that he referred to as a "third place between a person's job and a person's home."[26] He returned home and tried unsuccessfully to get his bosses to open espresso bars in Seattle. Schultz was apparently driven by the higher purpose of creating a "third place" for Americans that would "connect people and create community." He quit his job to start his own three-store espresso bar, eventually buying Starbucks from his previous bosses in 1987 and launching the company that we know today.

As in our model, entrepreneurs like Schultz often invest in opportunities that others ignore, because they derive higher utility from ventures that are connected to their higher purpose than those motivated solely by profit would. This is illustrated in Starbucks example not only in the behavior of the original owners of Starbucks who wanted no part of Schultz's vision, but also in the behavior of some on

[25] See Kaplan (2011).
[26] See Kaplan (2011).

Wall Street in the early 1990's when Schultz began discussions about taking Starbucks public. As Kaplan (2011) reports:

"As Schultz recalled to an interviewer, 'They'd say, 'You mean you're going to sell coffee for a dollar in a paper cup, with Italian names that no one in America can say – at a time when no one is drinking coffee and I can get coffee at the local coffee shop for 50¢? Are you kidding me?"

This paper suggests that, as an alternative to irrational optimism, the pursuit of higher purpose may help illuminate why the reaction of entrepreneurs to opportunities often differs so starkly from the reaction of others.

B. Innovation

Companies that are led by those with a sense of higher purpose may also have a leg up on their competitors when it comes to innovation. As we saw in Proposition 4, a higher purpose can lead companies to invest in exploratory projects that spur innovation when pure wealth maximization suggests they should not.[27]

Kanter (2011) cites numerous examples of companies that came up with innovative business ideas because they were driven by a sense of higher purpose. One of the examples is Cemex, a company that started Construrama, a distribution program for small hardware stores, in 2001, as part of its competitive strategy in Latin America. In accordance with its core values, Cemex only sought dealers for distributing its product who were trusted in their local communities, and met its service standards of participation in community-building endeavors like improving schools and building orphanages. This approach apparently led to numerous service innovations that have fueled Construrama's growth and qualification as a large retail chain in Latin America.

C. Leadership and Higher Purpose

Our theory suggests that leaders who are inspired by a higher purpose are also often able to motivate others to join the cause and contribute effort. Examples of this are all around us. *The Harvard Business Review* (November 2011) reports an interview with M.R. Naryana Murthy, founder of Infosys, a large information-technology company that exports software services. In 1981, when "ethical business" was an almost unheard-of concept in India, Murthy created a "value-based" corporation when he launched Infosys. Murthy's stated higher purpose was to create India's "most respected company

[27] Kanter (2011) writes:
"Articulating a purpose broader than making money can guide strategies and actions, open new sources for innovation, and help people express corporate and personal values in their everyday work."

delivering best-of-breed technology solutions and employing best-in-class professionals." As Murthy put it: "Making money wasn't essential; earning respect was."

Another example is provided by the testimony given by Henry Ford in 1916-17 in connection with a lawsuit filed by two of the company's shareholders, John and Horace Dodge, who were objecting to the company's slashing of prices on the Model T and its plan to withhold special dividends and invest in plant expansion. We quote Ford's court testimony from Lewis (1976):

> Once on the witness stand, Ford gave answers which – if their purpose was to please the public – could not have been better written by any public relations expert in the land.
>
> "Now," said Elliott G. Stevenson, the Dodges' truculent attorney. "I will ask you again, do you still think that those profits were 'awful profits?'"
>
> "Well, I guess I do, yes," replied Ford.
>
> "And for that reason you were not satisfied to continue to make such awful profits?" the lawyer inquired.
>
> "We don't seem to be able to keep the profits down," apologized Ford.
>
> "…Are you trying to keep them down? What is the Ford Motor Company organized for except profits, will you tell me, Mr. Ford?"
>
> "Organized to do as much good as we can, everywhere, for everybody concerned."
>
> The dumbfounded attorney quit for the day. However, in his need to prove that a business firm's primary responsibility is to its stockholders, he returned to the attack. "What," he asked Ford, "is the purpose of the (Ford) company?"
>
> "To do as much possible for everybody concerned," responded Ford, "to make money and use it, give employment, and send out the car where the people can use it … and incidentally to make money … Business is a service not a bonanza."
>
> "Incidentally make money?" queried the attorney.
>
> "Yes, sir."
>
> "But your controlling feature … is to employ a great army of men at high wages, to reduce the selling price of your car, so that a lot of people can buy it at a cheap price, and give everybody a car that wants one."
>
> "If you give all that," replied Ford, who must have felt that Stevenson had admirably stated his policies, "the money will fall into your hands; you can't get out of it."

VI. CONCLUSION

This paper has taken a modest step in the direction of developing a theory of the economics of higher purpose. Our definition of higher purpose is that it is the pursuit of a goal that transcends measureable financial benefits, and whose *outcome* may *not* be realized during the planning horizons of the principal and the agent. Thus, the positive utility associated with the higher purpose comes from the *pursuit* of the higher purpose, i.e., from the effort and capital investments in the higher purpose, This, as has been noted in previous research, diminishes moral hazard, decreases the cost of labor and increases capital inputs.[28]

[28] In a sense, our paper provides economic content to statements like the one by Howard Schultz, the founder of Starbucks, suggesting that social responsibility can enhance profits: "There needs to be a balance between commerce and social responsibility. The companies that are authentic about it will make more money."

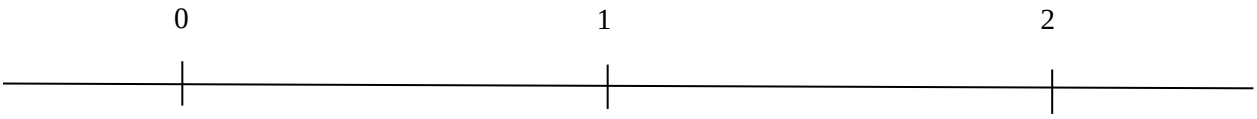
Those who pursue a higher purpose in conjunction with the business goal of wealth maximization can also generate additional resources for *others*, including those whose sole purpose is wealth maximization. Thus, they can relax budget constraints for others. Nonetheless, an important message of this paper is that principals who are solely motivated by wealth maximization may be essential for the viability of the higher-purpose principals. When principals need to raise external financing, the presence of principals who are solely interested in wealth maximization may be necessary for the higher-purpose principals to be able to raise financing. Thus, the pure wealth maximizers and those who also pursue a higher purpose may be symbiotic in their relationship, with one group helping relax budget constraints for the other group, and in turn, being afforded greater access to external finance due to the presence of the other group. In fact, the absence of either type of principal can lead to a market breakdown involving no project investments.

Our view that the outcome of the pursuit of higher purpose may be realized beyond the planning horizons of the principal and the agent (call this "long-term" higher purpose) is not consonant with many situations, including various examples discussed in the previous section, in which some outcomes are realized within the planning horizons of agents and principals (call this "short-term" higher purpose). How would our analysis be affected by this?

The answer depends, in part, on how one describes the preferences of the principal and the agent with respect to the short-term higher purpose. The simplest way to modify preferences would be to introduce a concern for the higher-purpose outcome itself. To the extent that this outcome has randomness in it, the agent's risk aversion will play a role in the principal's choice of which higher-purpose initiatives to pursue. Levels of risk that may have been acceptable when the principal and the agent derived utility *solely* from the *pursuit* of the higher purpose may now be avoided when the outcome of the pursuit matters as well. Thus, it is possible that, from the standpoint of encouraging risk-taking and entrepreneurship, if the benchmark is the set of actions that a profit-maximizing principal would choose, then long-term higher-purpose pursuit generates actions that deviate more from the benchmark than do the actions generated by short-term higher-purpose pursuit. Beyond this, we do not believe that our results would be qualitatively affected if the higher purpose being pursued was short-term.

Understanding the higher-purpose motivations of principals and agents may help us better understand entrepreneurship, risk taking and the emergence of business models and practices that may have relatively small pecuniary benefits. It may represent a small but important step in the direction of the development of "economics as a moral science" the way it was first envisioned by Boulding (1969) in his *American Economic Association* presidential address many years ago.

Figure 1: Sequence of Events

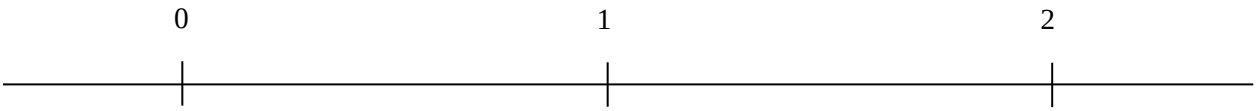


- Principal announces project choice and determines the level of investment, *I*, in the project.
- Principal hires an agent who is "aligned with the principal's higher purpose.
- Agent is given a compensation contract that may depend on the terminal project cash flow. If the agent accepts the contract, the principal invests *I*.

- Agent chooses effort *e*.

- The project cash flow is realized.
- Agent is paid his wage.
- Principal collects the residual.

Figure 2: Sequence of Events with External Financing



- Principal observes whether a project is available.
- Principal also has assets in place worth *A*.

- State of nature is realized which indicates whether the project is good or bad.
- Principal decides, after observing the state, whether to raise external financing of *I* for the project.
- If external financing is raised, an agent is also hired.
- Agent chooses effort *e* and principal invests *I* in the project.

- Project payoff is realized.
- Agent is paid.
- Investors who provided financing at t=1 are paid off from assets in place and from project payoff.

APPENDIX

Proof of Proposition 1: Consider the type-*N* principal first. Note that the *IR* constraint (6) will be binding at the optimum, so we can write:

$$u(\Phi^N) = \bar{u} + V(e_N)$$

or

$$\Phi^N = \psi(V(e_N) + \bar{u}) \tag{A-1}$$

where $\psi \equiv u^{-1}$, and ψ exists since *u* is strictly increasing. The principal's objective is to choose e_N to maximize

$$pe_N X(I) - \psi(V(e_N) + \bar{u}) - I \tag{A-2}$$

The first-order condition is:

$$pX(I) - \psi'(V(e_N^*) + \bar{u})V'(e_N^*) = 0 \tag{A-3}$$

The second-order condition is

$$-\psi''(\bullet)(V'(e_N^*))^2 - \psi'(\bullet)V''(e_N^*) < 0 \tag{A-4}$$

which is clearly satisfied since ψ and *V* are both strictly increasing and convex.

The analogous first-order condition for the type-*H* principal is:

$$pX(I) - \psi'(V(e_H^*) + \bar{u} - \lambda e_H^*)\left[V'(e_H^*) - \lambda\right] + \frac{\beta}{1 + Ie_H^*} = 0 \tag{A-5}$$

and it is easy to verify that the second-order condition holds. Note now that

$$\begin{aligned} &\psi'(V(e_N^*) + \bar{u} - \lambda e_N^*)[V'(e_N^*) - \lambda] - \frac{\beta}{1 + Ie_N^*} \\ &< \psi'(V(e_N^*) + \bar{u})V'(e_N^*) \\ &= pX(I) \quad \text{(by (A-3))} \end{aligned} \tag{A-6}$$

Thus, if (A-5) is evaluated at e_N^*, then

$$pX(I) - \psi'(V(e_N^*) + \bar{u} - \lambda e_N^*)[V'(e_N^*) - \lambda] + \frac{\beta I}{1 + Ie_N^*} > 0\,. \tag{A-7}$$

Since $\psi'(V(e) + \bar{u} - \lambda e)[V'(e) - \lambda] - \dfrac{\beta I}{1 + eI}$ is increasing in *e*, from (A-5) and (A-7) it follows that $e_H^* > e_N^*$.

Next we consider investment levels. The first-order condition for the type-*N* principal's optimal investment choice is:

$$pe_N^* X'(I_N^*) - 1 = 0 \tag{A-8}$$

Since *X* is concave in *I*, the second-order condition for a unique maximum is clearly satisfied. The type-*H* principal's optimality condition is:

$$pe_H^* X'(I_H^*) + \frac{\beta e_H^*}{1 + Ie_H^*} - 1 = 0 \tag{A-9}$$

Again, the second-order condition for a unique maximum is clearly satisfied.

Now from (A-8) and (A-9), we can write

$$pe_N^* X'(I_N^*) + \frac{\beta e_H^*}{1 + I_N^* e_N^*} > pe_N^* X'(I_N^*) = pe_H^* X'(I_H^*) + \frac{\beta e_H^*}{1 + I_H^* e_H^*} = 1 \tag{A-10}$$

Since $peX(I) + \frac{\beta}{1+eI}$ is decreasing in *I*, it follows from (A-10) that $I_H^* > I_N^*$. ■

Proof of Lemma 1: The proof follows immediately from the observation that the type-T_H agent's utility from pairing up with a type-*H* principal is $\bar{u} + \bar{u}_H$, which is strictly greater than $\bar{u}$, the utility from pairing up with a type-*N* principal (see (6) and (8)), for the same wage contract. Therefore, a type-*H* principal can satisfy the type-T_H agent's reservation utility at a lower cost than a type-*N* principal can. Moreover, it also costs the type-*H* principal less to elicit a given effort level from the type-T_H agent than from the type-T_N agent. Thus, a type-*H* principal strictly prefers a type-T_H agent. Similar logic can be used to prove that a type-*N* principal strictly prefers a type-T_N agent. ■

Proof of Proposition 2: Consider the type-*N* principal first. We can replace the incentive compatibility (IC) constraint (11) by the first-order condition:

$$pu(\Phi_s^N) - V'(e_N) = 0 \tag{A-11}$$

Since the IR constraint (10) is binding at the optimum, we can use (10) as an equality and (A-11) and solve them as simultaneous equations to obtain e_N and

$$\Phi_s^N = \Psi\left(\frac{\bar{u} + V(e_N)}{pe_N}\right) \tag{A-12}$$

which is (15).

Next consider the type-*H* principal. The IC constraint (14) can be replaced by the first-order condition:

$$pu(\Phi_s^H) + \lambda - V'(e_H) = 0. \tag{A-13}$$

Using the binding IR constraint (13) as an equality and solving it simultaneously with (A-13) delivers e_H and

$$\Phi_s^H = \Psi\left(\frac{\bar{u} + V(e_H) - \lambda e_H}{pe_H}\right), \tag{A-14}$$

which is (16). In both cases, it is readily verified that the second-order conditions for e_N and e_H to be unique global maxima are satisfied.

Now to prove $e_H = e_N$, substitute for Φ_s^H from (A-14) into (A-13) to write:

$$\frac{\left[\bar{u} + V(e_H)\right]}{e_H} - \lambda + \lambda - V'(e_H) = 0,$$

which means

$$\frac{\left[\bar{u} + V(e_H)\right]}{e_H} - V'(e_H) = 0,$$

which is exactly the same as (A-11) after substituting for Φ_s^N from (A-12). Thus, the first-order conditions, combined with the IR constraints, are identical for an *e*, implying that $e_H = e_N$. It is then clear from (A-12) and (A-14) that $\Phi_s^H < \Phi_s^N$.

Now, the first-order condition for the optimal investment level for the type-*N* principal is:

$$pe_N X'(I_N) - 1 = 0. \tag{A-15}$$

The second-order condition clearly holds since *X* is concave. For the type-*H* principal, the first-order condition is:

$$pe_H X'(I_H) + \frac{\beta e_H}{1 + I_H e_H} - 1 = 0 \tag{A-16}$$

Once again, the second-order condition is easy to verify.

Since $e_H = e_N$, evaluating, (A-16) at I_N yields (using (A-15)):

$$pe_N X'(I_N) + \frac{\beta e_N}{1 + e_N I_N} - 1 > 0. \tag{A-17}$$

Since $peX'(I) + \frac{\beta e}{1 + eI} - 1$ is decreasing in *I*, (A-17) and (A-16) taken together imply $I_H > I_N$.

Lastly, we need to prove that the type-*H* principal enjoys higher expected utility. The equilibrium expected utility of the type-*N* principal

$$\begin{aligned}
&= pe_N[X(I_N) - \Phi_s^N] - I_N \\
&< pe_N[X(I_N) - \Phi_s^N] + \beta \ell n(1 + I_N e_N) - I_N \\
&\le pe_H[X(I_H) - \Phi_s^H] + \beta \ell n(1 + I_H e_H) - I_H. \\
&= \text{equilibrium expected utility of type-}H\text{ principal.}
\end{aligned}$$

■

where the last (weak) inequality follows from the fact that I_H maximizes the function

$$pe\left[x(I) - \Phi_S^H\right] + \beta \ell n\left(1 + Ie\right) - I.$$

■

Proof of Proposition 3: Consider (35) – (37). Using the first-order-condition representation of (37), the optimal choice of effort satisfies:

$$qu(\hat{\Phi}_s^H) + \lambda - V'(\hat{e}_H) = 0 \tag{A-18}$$

and from (36), we have

$$u(\hat{\Phi}_s^H) = \frac{\bar{u} + V(\hat{e}_H) - \lambda \hat{e}_H}{q\hat{e}_H} \tag{A-19}$$

Thus, substituting (A-19) into (A-18) yields

$$\bar{u} + V(\hat{e}_H) - \hat{e}_H V'(\hat{e}_H) = 0 \tag{A-20}$$

Thus, as we have seen before, $\hat{e}_H$ is independent of λ. Moreover, from (35), the type-*H* principal's utility at the optimum is:

$$q\hat{e}_H\{X - \hat{\Phi}_s^H\} - I + \beta \ell n(1 + I\hat{e}_H) \tag{A-21}$$

which is strictly increasing in β and strictly decreasing in $\hat{\Phi}_s^H$. Moreover, holding $\hat{e}_H$ fixed, $\hat{\Phi}_S^H$ is strictly decreasing in λ. Thus, the expression in (A-21) is strictly increasing in λ, and if $\beta \geq I / \ell n(1 + I\hat{e}_H)$, then it is clear that the expression in (A-21) is strictly positive for β and λ large enough. ■

Proof of Lemma 2: From our earlier analysis we know that $\tilde{e}_N = \tilde{e}_H$ and $\Phi_s^H < \Phi_s^N$. Thus, from (43) and (48) it follows that $\tilde{\alpha}_H < \tilde{\alpha}_N$ since α is clearly increasing in Φ_s^H. Now, the type-*N* principal's expected utility at the optimum is:

$$\begin{aligned}
&[1 - \tilde{\alpha}_N]\{r\tilde{e}_N[X - \Phi_s^N] + A\} \\
&< [1 - \tilde{\alpha}_N]\{r\tilde{e}_N[X - \Phi_s^N] + A\} + \beta \ell n(1 + I\tilde{e}_N) \\
&< [1 - \tilde{\alpha}_H]\{r\tilde{e}_H[X - \Phi_s^H + A\} + \beta \ell n(1 + I\tilde{e}_H) \\
&\text{since } \tilde{e}_H = \tilde{e}_N, \tilde{\alpha}_H < \tilde{\alpha}_N, \text{ and } \Phi_s^H < \Phi_s^N
\end{aligned}$$

■

Proof of Proposition 4: We know that (44) guarantees that the type-*N* principals do not seek financing when the state of nature is unfavorable. But from Lemma 2 we know that the expected utility of the type-*H* principal at the optimum exceeds that of the type-*N* principal at the optimum. Thus, there exist parameter values such that the type-*H* principals will seek financing even when the unfavorable state has occurred, which means they will seek financing regardless of the state. Moreover, given (42), it also follows that (48) will not hold for any $\alpha \in [0,1]$ if δ is small enough (since it does not hold at $\delta = 0$, by continuity it will fail to hold for $\delta > 0$ small enough). Thus, investors will refuse to provide financing for δ small enough, and the market breaks down.

Now, if the type-*N* principals are also in the market, then if even one type-*N* principal is seeking financing, investors know that the unfavorable state has not occurred and will therefore provide financing. If no type-*N* investors are in the market, then investors form the following posterior belief:

$$\Pr\ (\textit{Unfavorable state has occurred} \mid M\ \textit{type-N principals absent})$$

$$= \frac{\Pr(M\ \textit{type-N principals absent} \mid \textit{unfavorable state})\Pr(\textit{unfavorable state})}{\Pr(M\ \textit{type-N principals absent})}$$

$$= \frac{[1-\delta]}{[1-\delta]+[1-\gamma]^M\,\delta} \tag{A-22}$$

where γ is the probability of project availability. Note that this posterior probability converges to 1 as $M \to \infty$. Thus, for *M* large enough, the posterior probability that the unfavorable state has occurred is so high that investors refuse to provide funding if no type-*N* principals are in the market, and the market breaks down. ■

Proof of Proposition 5: Take h_2 as a given and calculate h_1, given h_2, such that investors would be willing to provide financing. For this, calculate ξ, the investors' belief that the favorable state has occurred:

$$\begin{aligned}\xi &= \Pr(\text{favorable state} \mid \text{first period principal was type-}N) \times \Pr\ (\text{principal type-N}) \\ &\quad + \Pr(\text{favorable state} \mid \text{first-period principal was type-}H) \times \Pr\ (\text{principal type-}H) \\ &= qe_H^1 h_1\end{aligned} \tag{A-23}$$

where e_H^1 is the optimal effort selected by a type-T_H agent working for a type-*H* principal in the first period.

Now, after observing a request for financing in the second period, investors can update their belief that the state if favorable. Let ξ_f be the posterior probability

Then,

$$\begin{aligned}\xi_f &= \Pr(\text{state favorable} \mid \text{financing sought}) \\ &= \frac{\Pr(\text{financing sought} \mid \text{state favorable})\ \Pr\ (\text{state favorable})}{\left\{\begin{array}{l}\Pr(\text{financing sought} \mid \text{state favorable}) \\ +\Pr\ (\text{financing sought} \mid \text{state unfavorable})\end{array}\right\}} \\ &= \frac{\xi(h_1)}{\xi(h_1)\xi + h_2\left[1-\xi(h_1)\right]}\end{aligned} \tag{A-24}$$

where $\xi(h_1)$ is defined in (A-23). For investors to be willing to provide financing, we need:

$$\xi_f\left[h_2 p\hat{\hat{e}}_H\left\{X-\hat{\hat{\Phi}}^H\right\}+\left[1-h_2\right]p\hat{e}_N\left\{X-\hat{\Phi}^N\right\}\right]+A>I \tag{A-25}$$

Now, $\partial\xi_f/\partial\xi > 0$ and $\partial\xi/\partial h_1 > 0$. Thus, the left-hand side of (A-25) is strictly increasing in h_1. At $h_1 = 0$, it follows from (65) that (A-25) is impossible to satisfy since $\xi_f = 0$. At $h_1 = 1$ and $h_2 = 0$, we know $\xi_f = 1$, so (64) guarantees that (A-25) will hold. Thus, by continuity, it will hold for $h_1 < 1$ close

enough to 1 and $h_2 > 0$ close enough to zero. Moreover, if $h_2 = 1$, then the value of the left-hand side of (A-25) is maximized at $h_1 = 1$, but then (65) guarantees that (A-25) will not hold. Thus, (A-25) cannot hold at $h_2 = 1$ regardless of h_1, and it cannot hold at $h_1 = 0$ regardless of h_2. Moreover, $\partial \xi_f / \partial h_2 < 0$. Thus, we have proved that $\exists h_1^* \in (0,1)$ close enough to 1 and $h_2^* \in (0,1)$ close enough to 0 such that for values of $(h_1, h_2) \in (h_1^*, 1) \times (0_1 h_2^*)$, a market breakdown is prevented, but $\forall (h_1, h_2) \notin (h_1^*, 1) \times (0_1 h_2^*)$ the market for investment in the second-period project breaks down. ■

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