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**ETHICS, PROPERTY RIGHTS INSTITUTIONS,
AND ECONOMIC GROWTH**

By

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ABSTRACT: Ethical choices of rational agents in our model are a fundamental cause of economic prosperity and growth and a critical factor in the development of property rights institutions. Financial transactions are a key feature, providing the channel through which morality and the institutional framework affect economic well-being. In equilibrium a more moral society gives rise to a higher rate of innovation and economic growth along with stronger protection of property rights and a more developed financial system. Furthermore, a higher degree of risk aversion enhances morality and raises the level and growth rate of output.

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“Some people find it easier and more agreeable to take than to make. This temptation marks all societies, and only moral training and vigilance can hold it in check.”

David Landes [1998], p. 522.

1. INTRODUCTION

Recent empirical findings underscore the paramount importance of a society’s property rights institutions for economic prosperity; institutions are a fundamental cause of long-term growth (Acemoglu, Johnson and Robinson [2001, 2002], Dollar and Kraay [2003], Easterly and Levine [2003], Acemoglu and Johnson [2005]).¹ However, while empirical research has confirmed the significance of property rights institutions for a country’s well-being, less clear is how such institutions are created, why some countries have good institutions while others have bad ones, and the channels through which strong property rights institutions promote economic prosperity. In this paper, we provide a simple theoretical framework for addressing these and related questions.

Our model extends the emerging theoretical literature on social conflict (Acemoglu [2005, 2006], Acemoglu and Robinson [2006a,b]), in which an economy’s institutional structure is the outcome of a political battle between different social groups, — for example between rulers, workers and producers, — with the group in political control choosing property rights institutions that are in its interests. We adopt this social conflict approach except that the competing groups in our model are characterized by their ethical temperament; conflict in our analysis takes place between moral and immoral agents. Consequently, we show that a country’s institutional structure may emerge endogenously from society’s dominant ethical disposition. Furthermore, aside from determining institutions, ethics in our model can have an independent effect on long-term development; moral agents develop skills that are more conducive to economic prosperity than are the skills of immoral agents.

The significance of a society’s ethical disposition is acknowledged informally by Adam Smith [1759] who considers property rights institutions to be an outcome of the moral values of society’s individual members. The importance of ethics for economic well-being has also been argued informally by several social scientists (Weber [1930],

¹ North and Thomas [1973] also acknowledge informally the importance of property rights institutions.

Harrison [1997], Landes [1998]); in this view, morality is paramount — institutions are secondary. For example, as Max Weber [1930] notes,

“The universal reign of absolute unscrupulousness in the pursuit of selfish interests by the making of money has been a specific characteristic of precisely those countries whose bourgeois-capitalistic development, measured according to Occidental standards, has remained backward. As every employer knows, the lack of *conscienziosita* of the laborers of such countries, for instance Italy as compared with Germany, has been, and to a certain extent still is, one of the principal obstacles to their capitalistic development. Capitalism cannot make use of the labor of those who practice the doctrine of undisciplined *liberum arbitrium*, any more than it can make use of the business man who seems absolutely unscrupulous in his dealings with others ...”²

Interestingly, however, despite the existence of abundant anecdotal evidence, morality as a vehicle for economic and institutional development has received relatively little attention in formal economic theory.

Our model focuses on society’s ethical disposition as a crucial factor of institutional structure and economic prosperity. An agent makes a rational, self-interested choice as to whether to become either a moral or an immoral person. Both moral and immoral agents make rational decisions with perfect foresight, but moral agents develop different skills — and thus exhibit a different economic behavior afterwards — than immoral agents. The financial sector is at the heart of our analysis and is the channel through which a society’s ethical disposition and institutions affect economic performance. Aside from their ethical types, agents are also characterized by their business roles — investors or entrepreneurs. Investors finance the projects of entrepreneurs. Moral entrepreneurs are predisposed to working with investors and have developed the skills necessary for the creation of new output, while immoral entrepreneurs are predisposed to appropriating the resources of their investors and have developed the relevant skills.

To protect themselves from immoral entrepreneurs, investors monitor the projects they finance. However, the effectiveness of an investor’s monitoring efforts depends on the prevailing legal system; a legal regime that provides strong protection of property rights enables an investor to more likely be successful in detecting and blocking an

² Weber [1930], p. 61.

immoral entrepreneur's actions. In the political battle for the establishment of legal rules, agents rationally support the regime that is in their best interests. A moral agent always supports strong property rights institutions, while an immoral agent supports weak property rights institutions provided that the resulting increase in his profit if he later turns out to be an entrepreneur outweighs the resulting decrease in his profit if he turns out to be an investor.

Agents of the ethical type that is dominant at any particular point in time impose their preferred legal regime on society, thereby increasing their expected payoffs. There are thus two possible equilibria at each point in time. In the moral equilibrium, the proportion of moral agents in the population is high, allowing moral agents to prevail politically and establish strong private property rights institutions. In the immoral equilibrium, on the other hand, the group of immoral agents prevails politically, and they determine the legal regime.

Our paper reaches several conclusions regarding economic development. At any given point in time, the moral equilibrium leads to a higher level of output and welfare than the immoral equilibrium. This difference arises because first, the moral equilibrium has a larger relative number of moral entrepreneurs who work productively with their investors to successfully complete projects, and second, the moral equilibrium has stronger property rights institutions that enhance the effectiveness of investor monitoring. In addition, the financial system is better developed in the moral equilibrium in that a larger fraction of the now higher level of output is externally financed. Further, we show that aside from affecting the level of output, morality impacts output's rate of growth; that is, a favorable ethical disposition is shown to promote advantages of scale in research and development, thereby leading to a higher growth rate of the economy.

Our analysis also examines the effects of risk aversion on economic performance. We show that a higher degree of risk aversion induces investors to apply more monitoring to reduce the volatility of their payoff. The expectation of such increased monitoring discourages agents from choosing to become immoral. In addition, risk aversion makes entrepreneurs less willing to withstand the risk that is inherent in appropriation activities. Overall, a higher degree of risk aversion among members of a

society leads to a more favorable ethical disposition, as well as a higher level and growth rate of output, in both the moral and the immoral equilibrium.

We next describe how the main implications of our model relate to previous empirical research. Regarding the importance of property rights institutions, our model implies that stronger institutions are associated with greater economic prosperity and a higher rate of economic growth, which is consistent with the empirical results of Acemoglu, Johnson and Robinson [2001, 2002], Dollar and Kraay [2003], Easterly and Levine [2003] and Acemoglu and Johnson [2005]. Complementing the view that institutions determine the structure of economic incentives in society, our model also stresses the role of ethics and demonstrates that morality can have an effect on agent economic behavior that is independent from the institutional framework. This link seems to be supported by the empirical evidence. Recognizing that a possible proxy for morality can be the intensity of religious beliefs, Guiso, Sapienza and Zingales [2003] and Barro and McCleary [2003] show that even after controlling for institutional differences, stronger religious beliefs (i.e., greater morality) are associated with less rent seeking and a higher rate of economic growth.

Another implication of our model that supplements existing theory (Acemoglu [2005, 2006], Acemoglu and Robinson [2006a,b]) concerns the effects of external institutional intervention. In practice, property rights institutions are sometimes imposed exogenously by an external power, as in the cases of Soviet-backed communism and European colonialism. In our analysis, because an external power's institutional precommitment affects the future ethical choices of agents, it may take several decades for the full impact on the rate of economic growth to unfold. This insight complements existing research which only predicts a direct immediate impact of an externally-imposed property rights change.³ Our predictions are consistent with the development pattern of some communist countries, such as North Korea. After World War II, the Soviet-backed communist regime in North Korea imposed weak property rights institutions, while South Korea established a system of stronger property protection. As our model predicts, although the property rights change in North Korea took place before 1950, the full

³ In Acemoglu [2005, 2006] and Acemoglu and Robinson [2006a,b], the full impact of a change in property rights (or economic) institutions on output and economic growth is immediate. A change in political institutions, on the other hand, may not necessarily translate into a change in property rights institutions.

divergence between the growth rates of North and South Korea occurred only after the early 1970s (Figure 1).

Our model also implies that a higher degree of risk aversion may be associated with a more moral society and thus with a higher rate of economic growth. Although this implication has not yet been directly tested in the empirical literature, it is consistent with substantial anecdotal evidence. For example, according to the 2005 Transparency International Corruption Perceptions Index (CPI), the East Asian tigers — i.e., Singapore, Hong Kong, Taiwan, South Korea — exhibit very low levels of corruption by developing country standards (Transparency International [2005]). Singapore, for instance, has the 5th highest CPI score in the world, which implies that it exhibits less corruption than developed countries such as Sweden, Germany or the United States. Furthermore, the population of East Asia tends to be risk averse; Confucianism promotes risk aversion and a taste for conservatism and stability, as is also indicated by the high saving rates of East Asian economies (Economist [1998], Landes [1998]).⁴ By bringing out the potential link between risk aversion and morality, our analysis may thus contribute to the explanation of the East Asian “economic miracle”.

Besides contributing to the literature on social conflict (Acemoglu [2005, 2006], Acemoglu and Robinson [2006a,b]), our analysis also relates to the theoretical research on rent seeking and appropriation. In particular, Murphy, Shleifer and Vishny [1991, 1993], Acemoglu [1995], Ehrlich and Lui [1999] and Grossman and Kim [2000] explore the impact of rent seeking on the allocation of talent. It is shown that an economy that inherits an unfavorable allocation of talent (significant corruption) provides greater rewards for appropriation and reaches an equilibrium with a high level of such behavior.

We extend this literature in several ways. Our paper introduces endogenous property rights institutions into the appropriation framework and thus explores the role of institutions as well as the link between institutional structure and skill allocation (or ethical disposition). Second, rather than assuming that expropriators (exogenously) seize a certain fraction of the output, as is commonly assumed in the literature, our model

⁴ Landes [1998] considers risk aversion to be a negative economic trait of East Asian societies. He points out, for example, that a main reason that the great geographical discoveries in the 15th and 16th century were made by the Europeans, rather than by the Chinese, was that risk aversion induced China to abandon its program of great voyages. Our analysis, on the other hand, focuses on the positive effects of risk aversion.

incorporates the mechanics and microfoundations of appropriation. In particular, we focus on financial transactions — investors are vulnerable to appropriation by entrepreneurs — thereby enabling us to demonstrate the mechanics of appropriation and to examine the effects of morality on financial systems (as well as related issues). Third, in addition to generating a one-time level effect regarding output, as in most existing studies, expropriation in our work also affects a country's rate of growth.⁵

Finally, our paper touches upon another stream of research — that which seeks to explain the relation between finance and growth. Views have long differed on whether financial development causes economic growth (Greenwood and Jovanovic [1990], King and Levine [1993b]) or whether causality runs in the opposite direction (Robinson [1952]). We show that the link between a developed financial system and a high rate of economic growth may not be causal — the two may instead be driven by a third factor, namely a country's ethical disposition.

The paper consists of six sections. Section 2 describes the basic model, and section 3 solves for the equilibrium of the basic model. Section 4 extends the basic model to examine economic growth. Section 5 discusses the empirical implications of the analysis. Finally, section 6 presents some conclusions.

2. THE MODEL

The economy has a continuum of agents whose measure is normalized to unity. Nature randomly gives each agent either a physical or an intellectual endowment. A physical endowment consists of one unit of funds, while an intellectual endowment consists of an idea for a business project. We refer to an agent with a physical endowment as an investor (N) and one with an intellectual endowment as an entrepreneur (E). It is assumed that these types are common knowledge. Furthermore, for simplicity and without loss of generality, we assume that the two types are equally likely.

Because agents do not have both physical and intellectual endowments, each agent needs another with the complementary endowment to be able to implement a project. In this regard, we assume that agents — investors and entrepreneurs — are

⁵ In a different vein, Murphy, Shleifer and Vishny [1991] and Ehrlich and Lui [1999] also show that appropriation affects economic growth.

randomly matched in pairs and given the opportunity to initiate projects. A joint venture occurs when both the investor and the entrepreneur in a matched pair agree to work together, i.e., the investor provides the one unit of funds needed to fund the entrepreneur's project. An investor is paired with only one entrepreneur, and vice versa. For simplicity, we assume that the investor and the entrepreneur receive a fraction k and $1 - k$ of the output of the project respectively, where k is exogenously given. It is straightforward to show that such a fixed sharing rule can also be the endogenous outcome of a bargaining game between an investor and an entrepreneur.⁶

In keeping with our emphasis on the importance of morality for financial and economic development, we also characterize an agent by his ethical type — agents are either moral (M), or immoral (I). Although both ethical types aim at maximizing their personal payoffs, they develop different skills and thus pursue payoff maximization in different ways. For example, moral entrepreneurs have good project management skills, but do not have appropriation skills; they engage in the creation of new value or new output from existing funds. Immoral entrepreneurs, on the other hand, have only expropriation skills that can be used to appropriate the resources of others — in our case, the resources of investors, — rather than to create new value. For example, an immoral entrepreneur may attempt to transfer and siphon off the resources of a joint venture for his own benefit or abuse his management position to obtain unreasonable benefits and perks, or even resort to outright theft of investor funds.

While investors, too, may be either moral or immoral, their ethical type does not matter in our model. Investors are assumed to merely provide funds without the opportunity to engage in appropriation activities; thus, a moral investor behaves identically to an immoral investor. Our focus only on entrepreneurs (and not investors) who engage in unethical behavior is consistent with the literature's general emphasis on

⁶ As industrial organization theory shows (Tirole [1988]), after an investor's investment in a project has become sunk (i.e., not recoverable) but before the completion of a project, an entrepreneur has the opportunity to renegotiate his share in the joint venture by threatening to abandon the management of (and thus effectively terminate) the project (hold-up problem). In this renegotiation, the investor obtains a fraction k and the entrepreneur obtains a fraction $1 - k$ of the surplus over the disagreement point, i.e., of the joint venture's ownership in our model, where k is a constant and $k \in [0, 1]$ (Nash bargaining solution). Any earlier agreements between an investor and an entrepreneur may not be credible because of an entrepreneur's opportunity to renegotiate *ex post*. For this reason, the fixed sharing rule that we assume for simplicity in our model may also be the endogenous outcome of a bargaining game between investors and entrepreneurs.

the one-sided nature of moral hazard in investor-entrepreneur relationships. In our setting, moral hazard stems from the entrepreneur that manages a project, rather than the investor that finances it, which is consistent with the finance literature (e.g., Holmstrom and Tirole [1997], Freixas and Rochet [1997]).⁷ We will later discuss how the agent's ethical type is determined.

Defining immoral behavior as an agent's propensity to appropriate the belongings of others is in harmony with most major ethical systems in the world. In the Old Testament, for example, the 8th Commandment, points out that "Thou shalt not steal," while the 10th Commandment stresses that "Thou shalt not covet thy neighbor's house, ..., nor his ox, nor his ass, nor anything that is thy neighbor's." Stealing and appropriation are also strictly condemned by the Koran, as well as by the teachings of Buddhism, Confucianism, Hinduism and other important religions.

In the model, a project that is initiated and managed by a moral entrepreneur has output V , where $V > 0$. On the other hand, a project of an immoral entrepreneur yields zero output, with the entrepreneur appropriating the investor's funds and deriving private income B from the project, where $B > 0$.⁸ As in Holmstrom and Tirole [1997] and Freixas and Rochet [1997], the investor is incapable of claiming this private income.

Before the completion of projects, only the agents themselves know their ethical types; afterwards, whether the agents were moral or immoral is observable, but not contractible. It is also assumed that

$$V - 1 > 0 > B - 1, \tag{1a}$$

$$kV - 1 > 0 \tag{1b}$$

where condition (1a) ensures that only good projects, i.e., projects managed by moral entrepreneurs, are economically viable and condition (1b) implies that an investor's share of output in a good project is higher than the funds that he has contributed.

⁷ However, were we to allow multiple investors pairing with one entrepreneur, there could be a possibility of unethical behavior by investors. But this setting would overly complicate our analysis without adding to our basic theme of how morality affects the nature of financial transactions.

⁸ While the project's output may be observable, it is not contractible.

An investor — not knowing if his corresponding entrepreneur is moral — has the opportunity to monitor the project to attempt to safeguard his funds. In this regard, we can view an investor's monitoring as the performance of an initial screening as well as the subsequent examination of activities throughout the duration of the project. An investor can choose how intensively to monitor the project and entrepreneur — this is captured in our model by the choice of a level of monitoring m , where $m \geq 0$. For simplicity, we will also use m to measure the investor's cost of this monitoring.

Monitoring is imperfect. An investor's probability of initially successfully detecting a bad project, or possibly preventing the immoral entrepreneur from shifting project assets to himself once the project is underway, is given by $P(m)$, where P is increasing and concave in m . Any detected attempt by the entrepreneur to take advantage of the investor causes the investor to stop the project and regain his one unit of invested funds. In this case, the investor merely stores his one unit of funds, while the entrepreneur then earns a zero payoff. If the immoral entrepreneur is not detected, on the other hand, the project pays zero to the investor and B in private income to the entrepreneur. In contrast, projects that are organized by moral entrepreneurs are always successful, are unaffected by investor monitoring, and are never stopped by investors.

While monitoring cost m might have several dimensions, it is probably simplest to think of it as reflecting the value of an investor's foregone leisure. Denoting the value of an investor's entire leisure by L , an investor's payoff is then equal to $L - m$ plus his share in project output (or his one unit of funds if he blocks a project). Obviously, entrepreneurs may also have leisure, and their project management or appropriation activities may consume part of this leisure. However, since entrepreneurial activities have fixed scale in the model, entrepreneurs have no decision to make that would be affected by how much leisure they have. Therefore, for simplicity and without any loss of generality, we can assume that the leisure of entrepreneurs is zero and thus the payoff of entrepreneurs consists only of output.

We turn now to the legal system that governs the economy. Society establishes laws and institutions that fix the strength of property rights — strong or weak. Strong property rights institutions offer greater protection (than weak property rights institutions) to investors against immoral entrepreneurs. We incorporate this feature by assuming that

the strength of property rights affects the effectiveness of the monitoring process. In particular, for any level of monitoring m , the probability $P(m)$ of successfully preventing a bad project is equal to $xp(m)$ in the presence of strong and $p(m)$ in the presence of weak property rights institutions, where $x > 1$. The function $p(m)$ is assumed to be increasing at a decreasing rate in the monitoring level, m , thereby ensuring the existence of equilibrium in the monitoring subgame. Strong property rights may include, for example, strict disclosure requirements for entrepreneurs, standardization of financial statements, and generally any other requirement that facilitates the ability of the investor to detect unethical behavior by the entrepreneur.⁹

Agents prefer the type of legal system that best serves their interests. When moral agents comprise at least a share $\bar{\theta}$ of the population, where $0 < \bar{\theta} < 1$, they are able to establish their preferred legal system; otherwise, the legal system is selected by immoral agents. This process is in the spirit of the social conflict literature (Acemoglu [2005, 2006], Acemoglu and Robinson [2006a,b], which stresses that an economy's legal and institutional structure is determined by the prevalent social group — either the group of moral or immoral agents in our model.

An agent chooses his ethical type — moral or immoral — at the beginning of his life. An agent makes his ethical decision with perfect foresight, aiming at maximizing his individual expected payoff. Ethical types are distinguished by different sets of skills; agents that choose to be moral develop project management skills, while immoral agents develop appropriation skills. The acquisition of skills constitutes a long-term training process that can start only at the beginning of an agent's life. The skills are intended to be used later if an agent turns out to be an entrepreneur (i.e., to have an idea for a business project).¹⁰ An agent's ethical choice at the beginning of his life is irreversible and his particular ethical predisposition characterizes him for the remainder of his life.

The long-term nature of skill development in our model and the rather inflexible agent behavior that logically follows is in the spirit of Stigler and Becker [1977] who point out that long-term skills cause rational agents to commit to a rather rigid course of action. Furthermore, the long-term nature of ethical choices is stressed by several social

⁹ Several different forms of property rights protection are discussed, for instance, by La Porta *et al.* [1998].

scientists and economists (e.g., Freud [1907], Frank [1987]), as well as by the ancient Greek philosopher, Heraclitus, who emphasized that “a man’s character is his fate.”

Overall, in our analysis an agent’s ethical choices stem from economic behavior, rather than from constraints.¹¹ Our model follows the standard game theory methodology of perfect foresight (Tirole [1988]). With rational expectations about the simultaneous ethical decisions of other agents and the future effects of these decisions on his payoff, an agent chooses his ethical type.

Because of the very long-term nature of ethical choices — an agent starts developing the skills that are relevant to his ethical type at the beginning of his life — decisions about the legal system are made in the game after agents have chosen their ethical types. Thus, ethical decisions constitute a longer-term commitment than institutional decisions. A society’s institutional structure, on the other hand, is a longer-term commitment than the business roles of agents. In practice, an agent’s business role — investor or entrepreneur — tends to be rather flexible, often changing during the agent’s life; an agent may be an investor in certain projects and an entrepreneur in others (although for simplicity our model assumes that an agent has only one business role). In contrast, institutions tend to be rigid and inflexible (North and Thomas [1973], Acemoglu, Johnson and Robinson [2001, 2002], Acemoglu and Robinson [2006a,b]). For this reason, agent business roles are determined later in our model than a society’s institutional framework. In any case, we must point out that our basic results do not depend on this sequence of stages; our main conclusions would be unchanged even if the two stages were reversed and agent business roles were determined earlier than society’s institutions.¹²

¹⁰ If an agent turns out to be an investor, on the other hand, the skills that he has developed remain unutilized because an investor does not have the opportunity to manage projects or to appropriate output.

¹¹ In Grossman and Kim [2000], on the other hand, morality is a non-pecuniary parameter in the utility function that constrains economic behavior.

¹² Specifically, let us relax the simplifying assumption that investors and entrepreneurs are equally likely in the population. Then, if we reversed the sequence of the two stages, our results would be similar so long as the proportion of investors in the population were sufficiently lower than the proportion of entrepreneurs, i.e., so long as the existing financial wealth were sufficiently concentrated within a small number of large investors. Investors would always support the establishment of strong property rights institutions to protect their funds. Entrepreneurs, on the other hand, would support the introduction of strong or weak institutions depending on whether they were moral or immoral. As in the basic model, both a moral and an immoral equilibrium would exist, and ethics would be a fundamental cause of economic prosperity. If, on the other

We also assume that society's ethical composition is observable, although the ethical type of any agent is only privately known until the end of the game (when projects are completed). An agent is always in a position to notice the overall proportion of the population that chooses to be moral or immoral, for example, because the two ethical types need to develop different skills and therefore enter separate training routines and schedules. By observing the sizes of the training services and facilities that are used by each ethical type, an agent may infer the proportion of the population that chooses to be moral or immoral.¹³

We thus have a six-stage game:

Stage 1: Each agent chooses his ethical type and begins acquiring the skills relevant for his type.

Stage 2: Agents set up a legal system that determines the strength of property rights.

Stage 3: Nature randomly gives each agent either a physical or an intellectual endowment.

Stage 4: Investors and entrepreneurs are randomly matched in pairs.

Stage 5: Investors choose the level of their monitoring and have the opportunity to stop projects.

Stage 6: Projects that were not terminated in stage 5 are completed; agents receive their shares in project output.

3. EQUILIBRIUM

To solve for the equilibrium, we proceed by backward induction. The fraction of immoral and moral agents in the population is denoted by θ^I and $\theta^M = 1 - \theta^I$ respectively. Then, in the presence of weak property rights institutions, an investor that funds an entrepreneur's project faces the following maximization problem to determine the level of monitoring in stage 5:

hand, the proportion of investors in the population were sufficiently high, i.e., if the distribution of the existing financial wealth were sufficiently broad, only a moral equilibrium would exist.

¹³ For example, if we consider project management skills to be more technical than appropriation skills, moral agents may need to receive more formal education than immoral agents. This is consistent with the empirical result of Glaeser and Saks [2004] that less corruption (as depicted in our model by a larger number of moral agents) is associated with a more educated population.

$$\begin{aligned} \text{Max}_m (1 - \theta^I)kV + \theta^I p(m) + L - m &\Rightarrow \\ \frac{\partial p(m)}{\partial m} &= \frac{1}{\theta^I}. \end{aligned} \quad (2)$$

The level chosen $m(\theta^I)$ satisfies condition (2). The expected payoff of an investor is

$$u^N = (1 - \theta^I)kV + \theta^I p(m(\theta^I)) + L - m(\theta^I). \quad (3)$$

The expected payoffs of moral and immoral entrepreneurs, respectively, are

$$u^{ME} = (1 - k)V, \quad (4a)$$

$$u^{IE} = (1 - p(m(\theta^I)))B. \quad (4b)$$

The expected payoff to investors, u^N , is decreasing in the fraction of immoral entrepreneurs among the population ($\partial u^N / \partial \theta^I = -kV + p(m(\theta^I)) < 0$). Furthermore, from expression (3), we note that u^N is strictly higher (lower) than $L + 1$ when θ^I is zero (one). Given that (3) is a continuous function of θ^I , there exists a unique level of θ^I between zero and one, say $\underline{\theta}^I$, for which expression (3) is exactly equal to $L + 1$. It then follows that if $\theta^I > \underline{\theta}^I$, investors do not fund any projects and their payoffs are equal to one (investors keep their funds) while the payoffs to entrepreneurs are zero.

When the legal system provides for strong property rights, an investor that funds an entrepreneur's project faces a maximization problem with the following first-order condition:

$$\frac{\partial p(m)}{\partial m} = \frac{1}{x\theta^I}. \quad (5)$$

An investor chooses a level of monitoring $M(\theta^I)$ that satisfies condition (5) and anticipates a payoff of

$$U^N = (1 - \theta^I)kV + \theta^I xp(M(\theta^I)) + L - M(\theta^I). \quad (6)$$

Furthermore, in the presence of strong property rights institutions, the expected payoffs to moral and immoral entrepreneurs, respectively, are

$$U^{ME} = (1 - k)V, \quad (7a)$$

$$U^{IE} = (1 - xp(M(\theta^I)))B. \quad (7b)$$

As before, there exists a unique level of θ^I between zero and one, say $\underline{\theta}^I$ (where $\underline{\theta}^I > \theta^I$), for which expression (6) is exactly equal to $L + 1$. As a result, if there is a sufficient number of immoral entrepreneurs, i.e., $\theta^I > \underline{\theta}^I$, investors do not finance any projects.

In stage 2, moral agents support the establishment of a legal system that will secure strong property rights. An agent that is moral and that subsequently becomes an entrepreneur in stage 3 will earn the same payoff, $(1 - k)V$, regardless of the nature of the legal regime (his project is implemented and he obtains $1 - k$ of the certain output); but in the event he becomes an investor, he will earn a higher expected payoff if there is strong protection of property rights.¹⁴ It therefore follows that a moral agent's expected payoff is higher if strong property rights institutions are established.

On the other hand, an immoral agent supports weak property rights in stage 2 if

$$\frac{1}{2}[p(m(\theta^I) - xp(M(\theta^I)))(B - \theta^I) + \frac{1}{2}[m(\theta^I) - M(\theta^I)]] < 0, \quad (8)$$

i.e., if his expected gain from weak property rights institutions in the case that he subsequently becomes an entrepreneur is higher than his expected loss if he were to become an investor. From conditions (2) and (5), it follows that $m(\theta^I) < M(\theta^I)$ and

¹⁴ This follows from the envelope theorem. Specifically, we have $\partial[(1 - \theta^I)kV + \theta^I xp(M(\theta^I)) - M(\theta^I)] / \partial x = \theta^I p(M(\theta^I)) > 0$.

$p(m(\theta^l)) < xp(M(\theta^l))$. Therefore, at least when $\theta^l \leq B$, implying that (8) is negative, immoral agents support the establishment of weak property rights institutions. In the rest of the paper we will focus on the case where condition (8) is met, and thus a political conflict takes place between the groups of moral and immoral agents. Otherwise, when condition (8) is not met, there is no social conflict; both moral and immoral agents support strong property rights, and thus ethics cannot be a cause of economic prosperity.

In stage 1, in equilibrium, the expected payoff of a moral entrepreneur is equal to the expected payoff of an immoral entrepreneur; otherwise, some agents would have an incentive initially to deviate and choose a different ethical type. There is thus both an immoral and a moral equilibrium in the game. In the immoral equilibrium, there are weak property rights institutions, and the proportion of immoral agents in the population, θ^{l*} , is determined as the unique solution to the equation $(1-k)V = [1 - p(m(\theta^l))]B$. In particular, θ^{l*} is defined by¹⁵

$$p(m(\theta^{l*})) = \frac{B - (1-k)V}{B}. \quad (9)$$

Similarly, in the moral equilibrium there are strong property rights institutions and the proportion of immoral agents in the population is θ^{l**} , where θ^{l**} is defined by¹⁶

$$p(M(\theta^{l**})) = \frac{B - (1-k)V}{xB}. \quad (10)$$

From (9) and (10) it follows that $\theta^{l*} > \theta^{l**}$.

Proposition 1: The proportion of immoral agents is θ^{l*} in the immoral equilibrium and θ^{l**} in the moral equilibrium, with $\theta^{l*} > \theta^{l**}$.

¹⁵ The equation $(1-k)V = [1 - p(m(\theta^l))]B$ has a unique solution because $[1 - p(m(\theta^l))]B$ is a continuous and decreasing function of θ^l .

¹⁶ If $[B - (1-k)V] < 0$, we have corner solutions with $\theta^{l*} = 0$ and $\theta^{l**} = 0$.

To ensure the existence of both a moral and an immoral equilibrium, we assume

$$\theta^{l**} \leq 1 - \bar{\theta} < \theta^{l*}, \quad (11a)$$

$$\theta^{l*} \leq B, \quad (11b)$$

$$\theta^{l*} \leq \underline{\theta}^l. \quad (11c)$$

Conditions (11b) and (11c) imply that when the fraction of immoral agents in the population is θ^{l*} , they support the establishment of weak property rights institutions, and subsequently, investors will choose to fund entrepreneurs' projects. According to (11a), when the proportion of immoral agents is θ^{l**} , the legal system is chosen by moral agents; alternatively, constituting the proportion θ^{l*} enables immoral agents to establish the legal system.

Finally, aside from the immoral and the moral equilibrium, the game can also reach an “idleness” trap — a range of equilibria where the proportion of immoral agents is so high, i.e., higher than $\underline{\Theta}^l$, that no projects are financed.

3.1. Financial System

We now examine the economy's financial system in the two equilibria. We will refer to those projects that have been managed by moral entrepreneurs and generated an output V , or by immoral entrepreneurs and generated an output B in the form of private income, as externally financed projects. The remaining output consists of investor funds that do not flow to entrepreneurs' projects, i.e., funds that investors store themselves because they have detected that the entrepreneurs that would otherwise be financed are immoral.

In the immoral equilibrium, the fraction of the economy's total output that stems from externally financed projects — i.e. from completed projects that are designed and managed by entrepreneurs but financed by investors — is

$$E^* = \frac{(1 - \theta^{l*})V + \theta^{l*}(1 - p(m(\theta^{l*})))B}{(1 - \theta^{l*})V + \theta^{l*}[p(m(\theta^{l*})) + (1 - p(m(\theta^{l*})))B]}. \quad (12)$$

In the moral equilibrium, the fraction of the economy's total output that stems from externally financed projects is

$$E^{**} = \frac{(1 - \theta^{**})V + \theta^{**}(1 - xp(M(\theta^{**})))B}{(1 - \theta^{**})V + \theta^{**}[xp(M(\theta^{**})) + (1 - xp(M(\theta^{**})))B]}. \quad (13)$$

To calculate $E^{**} - E^*$, we first notice that an investor's probability of avoiding the funding of a bad project is the same in both the immoral and the moral equilibrium — i.e., $p(m(\theta^*))$ is equal to $xp(M(\theta^{**}))$. This follows from conditions (9) and (10):

$$p(m(\theta^*)) = \frac{B - (1 - k)V}{B} = xp(M(\theta^{**})). \quad (14)$$

We thus have

$$E^{**} - E^* = \frac{p(m(\theta^*))(\theta^* - \theta^{**})V}{[\theta^* E_1 + V(1 - \theta^*)][\theta^{**} E_1 + V(1 - \theta^{**})]} > 0, \quad (15)$$

where $E_1 = p(m(\theta^*)) + [1 - p(m(\theta^*))]B$.

It follows that a larger fraction of the economy's output stems from externally financed projects in the moral than in the immoral equilibrium; investors in the moral equilibrium are more likely to invest rather than store their funds. As a result, we can view the financial system as more developed in the moral equilibrium.¹⁷

Proposition 2: Externally financed projects in the moral equilibrium account for a larger fraction of the economy's total output than in the immoral equilibrium, i.e., $E^{**} > E^*$.

It should be pointed out that the equilibrium degree of financial development is driven by the economy's ethical disposition and the associated allocation of skills, rather

than by the economy's property rights institutions. As expressions (2) and (5) imply, if we held a society's ethical disposition — i.e., the proportion of moral and immoral agents in the population — constant, imposing stronger property rights institutions would reduce, rather than enhance, financial development *ceteris paribus* (but also raise total output *ceteris paribus*); investors would be encouraged to monitor entrepreneurs more strictly, more bad projects would be blocked and thus less capital would be channeled to entrepreneurs.¹⁸

In the model, although an investor's probability of detecting an immoral entrepreneur is the same in both the immoral and the moral equilibrium, the investor attains this probability with a lower level of monitoring and therefore a lower cost in the moral equilibrium. In particular, because $x > 1$, we have

$$M(\theta^{l**}) < m(\theta^{l*}). \quad (16)$$

In the immoral equilibrium, investors need to apply greater monitoring and therefore incur greater costs to cope with the large number of immoral entrepreneurs in the population.

Proposition 3: Financial transactions entail greater monitoring in the immoral than in the moral equilibrium, i.e., $m(\theta^{l*}) > M(\theta^{l**})$.

3.2. Economic Welfare

Total output in the economy in the moral equilibrium exceeds total output in the immoral equilibrium by

$$0.5(\theta^{l*} - \theta^{l**})(V - E_1) > 0. \quad (17)$$

¹⁷ Our model focuses on the overall size of financial markets and does not distinguish between different types of markets, such as stock and bond markets or bank loans.

¹⁸ Such a reduction in financial development would be associated with enhanced efficiency and a higher level of total output in the economy. *Infra* note 19.

The larger fraction of moral entrepreneurs in the population ($1 - \theta^{**} > 1 - \theta^*$) leads to a greater number of good projects and consequently to greater total output.

The payoff to entrepreneurs is the same, $(1 - k)V$, in the two equilibria. Investors, however, are better off in the moral equilibrium, as shown by

$$(\theta^* - \theta^{**})[kV - p(m(\theta^*))] + m(\theta^*) - M(\theta^{**}) > 0. \quad (18)$$

In this equilibrium, investors earn a higher payoff because the proportion of immoral entrepreneurs in the population is lower and also because strong property rights institutions make monitoring more effective ($x > 1$).

Therefore, the moral equilibrium weakly Pareto dominates the immoral equilibrium in the model. Both equilibria are possible, however, because agents make decisions simultaneously in stage 1 and are thus unable to coordinate.

Proposition 4: The moral equilibrium leads to higher total output than and weakly Pareto dominates the immoral equilibrium.

Intuitively, the moral equilibrium weakly Pareto dominates the immoral one because the allocation of skills in the population of the former is more conducive to economic prosperity. A large fraction of moral entrepreneurs leads to a large number of productive projects and eventually to a high level of output. In addition, the establishment of strong property rights institutions makes monitoring more effective in the moral (than in the immoral) equilibrium.

Overall, the fundamental cause of economic prosperity in the model is a society's ethical disposition and skill allocation. Property rights institutions are also essential, but they arise from and in this regard are secondary to a society's ethical disposition. Specifically, institutions are important because they have an independent effect on the level of output and economic welfare by improving the effectiveness of monitoring. Even if we held a society's ethical disposition and skill allocation constant, stronger

property rights institutions would lead to more effective monitoring and thus higher output *ceteris paribus*.¹⁹

3.3. Risk Aversion

So far we have considered agents to be risk neutral. The utility of an agent has been equal to w , where w is an agent's payoff. In this section we will momentarily modify the model for the purpose of examining the effects of risk aversion. In particular, the utility of an agent in this section is equal to w^β , where $\beta \in (0,1)$. Parameter β is a measure of risk aversion. A low level of β is associated with a high degree of risk aversion. The coefficient of absolute risk aversion for the utility function is $(1-\beta)/w$ and is decreasing in β .

In the presence of weak property rights institutions, an investor's level of monitoring is determined by the following maximization problem in stage 5:

$$\begin{aligned}
& \underset{m}{\text{Max}} (1-\theta^I)(L+kV-m)^\beta + \theta^I p(m)(L+1-m)^\beta + \theta^I (1-p(m))(L-m)^\beta \Rightarrow \\
& -(1-\theta^I)\beta(L+kV-m)^{\beta-1} + \theta^I \frac{\partial p(m)}{\partial m} (L+1-m)^\beta - \theta^I p(m)\beta(L+1-m)^{\beta-1} \\
& -\theta^I \frac{\partial p(m)}{\partial m} (L-m)^\beta - \theta^I (1-p(m))\beta(L-m)^{\beta-1} = 0. \tag{19}
\end{aligned}$$

The derivative of expression (19) with respect to β is²⁰

$$\begin{aligned}
& -(1-\theta^I)(L+kV-m)^{\beta-1} - \theta^I p(m)(L+1-m)^{\beta-1} - (1-\theta^I)\beta(L+kV-m)^{\beta-1} \ln(L+kV-m) \\
& + \theta^I \frac{\partial p(m)}{\partial m} (L+1-m)^\beta \ln(L+1-m) - \theta^I p(m)\beta(L+1-m)^{\beta-1} \ln(L+1-m) - \theta^I \frac{\partial p(m)}{\partial m} (L-m)^\beta \ln(L-m) \\
& - \theta^I (1-p(m))\beta(L-m)^{\beta-1} \ln(L-m) - \theta^I (1-p(m))(L-m)^{\beta-1} < 0. \tag{20}
\end{aligned}$$

¹⁹ Stronger property rights institutions would allow investors to block a larger number of immoral entrepreneurs' projects. This would lead to a higher level of total output *ceteris paribus* because appropriation is an inefficient activity ($B < 1$).

²⁰ The derivative is negative (in the neighborhood of the optimal m) because expression (19) is equal to zero and $\ln(L+kV-m) > \ln(L+1-m)$.

Therefore, given the concavity of the probability function, a lower level of β (more risk aversion) leads to a higher level of m (more monitoring by investors). As risk aversion increases, investors apply more monitoring (for a given θ') to reduce the volatility of their payoff. We obtain a similar result if the economy has strong property rights institutions.

In stage 1, a higher degree of risk aversion leads to a greater proportion of moral agents in the population in both the moral and immoral equilibria. There are two reasons for this. First, and perhaps more importantly, the expectation of an increased level of investor monitoring reduces the expected payoff of immoral entrepreneurs (for a given θ') and thus discourages agents from initially choosing the immoral type. And second, the payoff of immoral entrepreneurs, which can be either B or zero, is riskier than the payoff of moral entrepreneurs, which is always equal to $(1 - k)V$; a higher degree of risk aversion thus makes agents more reluctant to become immoral.²¹

We thus have proposition 5.

Proposition 5: Increased risk aversion leads to a higher fraction of moral agents in the population in both the moral and the immoral equilibrium.

In equilibrium (moral or immoral), an investor's probability of detecting an immoral entrepreneur is $1 - [(1 - k)V / B]^\beta$, which is decreasing in β . Furthermore, since the proportion of moral agents in the population in the moral and the immoral equilibrium is also decreasing in β (proposition 5), we arrive at proposition 6.

Proposition 6: A higher degree of risk aversion leads to higher level of total output in the economy in both the moral and the immoral equilibrium.

²¹ The certainty of the payoff of moral entrepreneurs is a simplifying feature of our model that does not affect our results. It is straightforward to extend the model so that the payoff of moral agents is uncertain and still arrive at proposition 5. Assume, for example, that the project of a moral entrepreneur generates a revenue V^H with probability ε , and a revenue zero with probability $1 - \varepsilon$. Then, immoral entrepreneurs still have a riskier payoff than moral entrepreneurs so long as $(1 - k)V^H / B < 1$. In this regard, the empirical literature shows that immoral economic activities — such as illegal activities — are associated with significantly higher risk than moral activities (Levitt and Venkatesh [2000]). Furthermore, proposition

It follows that the risk aversion of agents, which is an exogenous taste parameter in our model, can have a significant effect on economic performance. Risk aversion leads to a more ethical society and a higher level of total output.²²

3.4. External Institutional Intervention

In practice, an interesting situation arises when a country's property rights institutions are exogenously imposed by an external power, instead of being endogenously determined by the population. Soviet-backed communist regimes and former European colonies are two good examples (Acemoglu, Johnson and Robinson [2001, 2002], Acemoglu and Johnson [2005]). In our model, a foreign power's precommitment to establish weak or strong property rights institutions in a country may have two effects on the level of output.

If external intervention occurs later than stage 1 (where ethical choices are made), there is only a direct institutional effect as institutions have an independent *ceteris paribus* effect on a country's level of output. If, however, the external power makes its institutional precommitment before stage 1, there is also an indirect ethical effect. Specifically, the external power's precommitment affects the expectations of agents about society's future legal and institutional system, thereby determining the country's ethical disposition by inducing agents to coordinate to an immoral or moral equilibrium. It follows that in practice, an external institutional intervention has only a direct institutional effect on the current generation of agents (who have already made their ethical choices), but a full-fledged institutional and ethical effect on the next generation of agents (whose ethical disposition has not yet been determined).

5 would also hold for a certain range of parameter values even if moral entrepreneurship were riskier than immoral entrepreneurship because increased risk aversion would lead to increased monitoring by investors.

²² Of course, an opposing effect of risk aversion, which is not examined in our analysis, is that risk averse agents may forego riskier projects with a high expected output for safer projects with a low expected output. It is thus possible that even if risk aversion leads to a more ethical society, it may sometimes decrease the level of an economy's output. *Supra* note 4.

4. MORALITY AND ECONOMIC GROWTH

The basic model has demonstrated that the ethical composition of society, as well as the resulting institutional structure, has an effect on the level of economic welfare. Switching from one equilibrium to the other affects the level rather than the growth rate of the economy's total output and welfare.²³ We will now extend our analysis to incorporate innovation, thereby enabling us to examine the impact of morality on economic growth, as well as the link between economic growth and financial development.

We do this by introducing research/development and manufacturing sectors in the economy — the coexistence of such sectors is a standard assumption in endogenous growth theory (Romer [1990]). Another extension is that the game takes place in multiple periods, rather than in one period as in the basic model. Specifically, at the end of a period t , each agent exits the game and is replaced by a new agent. Then in the next period $t + 1$, the game goes back to stage 1 and repeats with the new agents.

As before, we assume that in each period t nature randomly gives each agent one unit of either a physical endowment or an intellectual endowment, the agent thereby becoming either an investor or an entrepreneur, respectively. And as before, the ethical type of each agent at this point has already been established. Now, however, after an agent (entrepreneur) receives his intellectual endowment, he chooses a professional occupation, becoming either a researcher or a manufacturer. Occupational choices are made in stage 3a — between stages 3 and 4 — and are public information.

A moral entrepreneur/researcher uses the investment of his investor and society's existing stock of knowledge from previous periods to produce additional knowledge. Researchers maintain exclusive rights to their newly created knowledge for only one period; afterwards all innovations become public information. A moral researcher's production function in period t is

$$\Delta A_t^i = \gamma A_{t-1} \tilde{f}(H / H = 1), \quad (21)$$

²³ This implies that switching from an immoral to a moral equilibrium would lead to a one-time benefit, rather than a sustained increase in the economy's growth rate.

where ΔA_t^i is the newly created knowledge by researcher i in period t , A_{t-1} is society's entire stock of knowledge in period $t - 1$ (which has become public information in period t) and $\gamma > 0$. \tilde{f} is a function of the investor's physical input H , where $\tilde{f}(0) = 0$ and $\partial \tilde{f}(H) / \partial H > 0$. For simplicity, it is assumed that $\tilde{f}(1) = 1$. Expression (21) implies that the output ΔA_t^i of a researcher i is linear in the existing knowledge A_{t-1} .²⁴

Knowledge is an intermediate product that serves as an input to manufacturing. Thus, a moral entrepreneur/manufacturer utilizes the input of his investor, society's existing stock of knowledge from previous periods, and newly created knowledge that he purchases from researchers to produce a final output. A moral manufacturer's production function is

$$\omega^i = Af(H / H = 1), \quad (22)$$

where ω^i is the output of manufacturer i , A is the stock of knowledge that is used by the manufacturer and f is a function of the physical input H that is supplied by the investor. We have $f(0) = 0$ and $\partial f(H) / H > 0$. An investor always contributes exactly one unit of input if he decides to fund a project, i.e., $H = 1$.

Although immoral entrepreneurs also choose an occupation — researchers or manufacturers — we will assume that their choices are random and have no effect on their actions. That is, an immoral entrepreneur is unable to create new knowledge or manage manufacturing projects, and only aims at obtaining B ($B < 1$) input units by appropriating the input of his investor. Furthermore, immoral entrepreneurs are not in a position to utilize new knowledge productively in their projects.

Research takes place before manufacturing. A researcher sets a take-it-or-leave-it selling price for his innovation; the price is in terms of final output. Then, if a manufacturer consents to the price, he immediately obtains the researcher's new knowledge and signs a contract that requires him to transfer to the researcher the specified amount of final output in future. Research activities take place in stage 5a,

²⁴ This too is a standard assumption in endogenous growth theory (Romer [1990]). For example, according to this specification, although a researcher working today and one working 100 years ago may have the

which occurs between stages 5 and 6. Furthermore, in stage 5a researchers and manufacturers have the opportunity to sign contracts. Regarding the enforcement mechanism of research agreements, each research contract gives a researcher the right to seize his payment directly from a project's output if a manufacturer reneges.²⁵

In the economy, there exists a standardized inferior project, the idea for which is accessible to the general public and whose completion requires no management skills. Thus, if an investor does not enter into a joint venture with an entrepreneur (or if he successfully blocks a project), he can generate output by investing his unit endowment himself in the inferior project. This investment is the dynamic analogue to storage in the basic model, accounting for the possibility that the opportunities for such investors improve (rather than stay constant through time) as the stock of publicly available knowledge grows. The output of an inferior project at date t is an increasing function of the amount of publicly available knowledge, i.e., of A_{t-1} ; investing H units of the physical input in an inferior project results in output of $\alpha A_{t-1} H$. The output of an inferior project is lower than the investor's output share in a moral manufacturer's project, i.e., $\alpha < kf(1)$. Similarly, when an immoral entrepreneur obtains B units of the input by appropriating the input of an investor, he can invest in an inferior project, generating a private output of $\alpha A_{t-1} B$.

An investor's probability of successfully detecting and blocking a bad project is $P(s)$, where s is the time that the investor spends on monitoring. In the presence of weak property rights institutions, $P(s)$ is equal to $p(s)$, where $\partial p(s)/\partial s > 0$ and $\partial^2 p(s)/\partial s^2 < 0$. If property rights are strong, on the other hand, $P(s)$ is equal to $xp(s)$, where $x > 1$. The investor's opportunity cost of monitoring — the value of an investor's leisure time — is an increasing function of the amount of publicly available knowledge, A_{t-1} ; that is, a greater stock of publicly available knowledge provides more opportunities

same amount of physical inputs, the researcher working today is more productive because he can use all the additional knowledge accumulated during the last 100 years.

²⁵ Because an immoral researcher does not produce any new knowledge, he is unable to offer new knowledge to and sign contracts with manufacturers in stage 5a. Furthermore, a moral researcher eventually receives a zero payment from any immoral manufacturer with whom he signs a contract in stage 5a. Researchers (similarly to investors) are unable to claim an immoral manufacturer's private income; they are only able to claim a project's output.

for leisure for the investor. Thus, the opportunity cost m of time s that the investor spends on monitoring is $eA_{t-1}s$. It follows that s is equal to $m/(eA_{t-1})$.

4.1. Equilibrium of the Growth Model

By following the same procedure as in the basic model, we can see that in the presence of weak property rights institutions, when an investor funds an entrepreneur's project, he determines the extent of his monitoring $s(\theta_t^I)$ from $\partial p(s)/\partial s = e/(\alpha\theta_t^I)$, where $s = m/(eA_{t-1})$. In the presence of strong property rights institutions, an investor solves $\partial p(s)/\partial s = e/(x\alpha\theta_t^I)$ to determine the level of monitoring, $S(\theta_t^I)$.

Similarly to the basic model, there is an immoral and a moral equilibrium in each period t , where the share of immoral agents in the population is θ^{I*} and θ^{I**} respectively ($\theta^{I*} > \theta^{I**}$). The equilibria are defined as follows

$$p(s(\theta^{I*})) = \frac{\alpha B - (1-k)f(1)}{\alpha B}, \quad (23a)$$

$$p(S(\theta^{I**})) = \frac{\alpha B - (1-k)f(1)}{x\alpha B}. \quad (23b)$$

It is straightforward to confirm that propositions 2, 3 and 4 still hold in the growth model.

In the analysis when there is a transition from a moral (immoral) equilibrium in period $t-1$ to an immoral (moral) equilibrium in period t , we have both a one-time level effect on current output (which was described in the basic model) and a sustainable growth effect on future output (which stems from the different size of the research sector and thus the different amount of new knowledge that is produced in period t). For this reason, the easiest and most intuitive way to establish the link between morality and economic growth is to examine the growth rate of an economy that reaches an immoral or a moral equilibrium in two (or several) consecutive periods. When an economy is in a moral (immoral) equilibrium in both periods $t-1$ and t , a comparison of the two periods reveals only a growth, rather than a level effect.

Then, if the economy remains in an immoral equilibrium for two consecutive periods $t - 1$ and t , the growth rate of total output from $t - 1$ to t is²⁶

$$g^* = \frac{Y_t}{Y_{t-1}} - 1 = \gamma(1 - \theta^{I*}) - 1, \quad (24)$$

If the economy remains in a moral equilibrium for two consecutive periods $t - 1$ and t , the growth rate of total output from $t - 1$ to t is²⁷

$$g^{**} = \gamma(1 - \theta^{I**}) - 1. \quad (25)$$

Because $\theta^{I**} < \theta^{I*}$, we have the relation $g^{**} > g^*$ between growth rates; total output grows at a higher rate if an economy remains in a moral rather than immoral equilibrium for two consecutive periods. Furthermore, it is straightforward to see that the growth rates of total economic welfare are exactly the same as the growth rates of output.²⁸

Proposition 7: The growth rate of total output or total welfare is higher when an economy remains in a moral rather than an immoral equilibrium for two consecutive periods, i.e., $g^{**} > g^*$.

Intuitively, research and innovation drive economic growth. The overall size of the group of moral entrepreneurs is larger in the moral equilibrium, leading to advantages of scale in research; researchers can sell their newly created knowledge among a larger group of moral entrepreneurs.²⁹ Thus, by fostering a more sizable research sector, the moral equilibrium speeds up technological progress and economic growth.

²⁶ If $\gamma(1 - \theta^{I*}) < 1$, we have a corner solution in the immoral equilibrium where no moral entrepreneur chooses to become a researcher. Then, the growth rate of the economy's total output is zero.

²⁷ If $\gamma(1 - \theta^{I**}) < 1$, we have a corner solution in the moral equilibrium. *Supra* note 26.

²⁸ For economic welfare, the value of investor leisure that is spent on monitoring is subtracted from total output.

²⁹ In the moral equilibrium the proportion of researchers in the population is higher than in the immoral equilibrium, i.e., $(1 - \theta^{I**})[1 - 1/(\gamma(1 - \theta^{I**}))] > (1 - \theta^{I*})[1 - 1/(\gamma(1 - \theta^{I*}))]$.

Similarly to the basic model, a society's ethical disposition and associated skill allocation here is the fundamental cause of economic growth. Although property rights institutions are important, they are secondary to morality in that they emerge endogenously from a society's ethical disposition. Also, as in the basic model, property rights institutions have a positive effect, *ceteris paribus*, on economic growth. However, to bring out this effect in the growth model, we need to relax the simplifying assumption of only one entrepreneur being paired with a particular investor.³⁰ If we allow an investor to finance more than one entrepreneur, stronger property rights institutions lead to increased economic growth, even holding society's ethical disposition unchanged. More funds are channeled to moral entrepreneurs, leading to advantages of scale in research.

Furthermore, it is straightforward to modify the model to examine the effects of risk aversion on economic growth. In particular, similarly to section 3.3, we momentarily assume that the utility of an agent is w^β , where w stands for agent payoff and $\beta \in (0, 1)$. By following the same procedure as before, we see that the proportion of immoral agents in the population is $\theta^I(\beta)$ in the immoral equilibrium and $\theta^{II}(\beta)$ in the moral equilibrium, where $\partial \theta^I(\beta) / \partial \beta > 0$ and $\partial \theta^{II}(\beta) / \partial \beta > 0$. If the economy remains in an immoral (moral) equilibrium for two consecutive periods $t - 1$ and t , the growth rate of total output or of total agent payoff from $t - 1$ to t is $g^I(\beta) = \gamma(1 - \theta^I(\beta)) - 1$ ($g^{II}(\beta) = \gamma(1 - \theta^{II}(\beta)) - 1$). We thus have $\partial g^I(\beta) / \partial \beta < 0$ and $\partial g^{II}(\beta) / \partial \beta < 0$.

Proposition 8: A higher degree of risk aversion leads to a higher growth rate of total output or of total agent payoff when the economy remains in a moral or an immoral equilibrium for two consecutive periods, i.e., $\partial g^{II}(\beta) / \partial \beta < 0$ and $\partial g^I(\beta) / \partial \beta < 0$.

³⁰ If this simplifying assumption is not relaxed, on the other hand, property rights institutions have no effect on economic growth *ceteris paribus*.

Intuitively, risk aversion enhances economic growth because it increases the proportion of moral agents in the population in both the moral and the immoral equilibrium. This leads to advantages of scale in research, thereby fostering innovation.³¹

Finally, the effect of an external institutional intervention on a country's rate of economic growth takes the same form as the effect on the level of output. There is only a direct institutional effect on the current generation of agents, but a full-fledged institutional and ethical effect on the next generation of agents.

5. EMPIRICAL IMPLICATIONS

The model has testable predictions for a country's economic development. Some of these implications are consistent with previous empirical findings while others are new and have not yet been tested. We first discuss the empirical literature that shows the significance of property rights institutions for economic growth and financial development. Implications 1 and 2 follow. It's important to note that these implications are also consistent with the theoretical research on institutions (Acemoglu [2005, 2006], Acemoglu and Robinson [2006a,b]), as well as the literature on law and financial development (Shleifer and Wolfenzon [2002]), and not unique to our model. We will later discuss the new implications that our analysis brings out.

Implication 1: A country's rate of economic growth is increasing in the strength of its property rights protection.

Implication 1 is consistent with the empirical results of Acemoglu, Johnson and Robinson [2001, 2002], Dollar and Kraay [2003], Easterly and Levine [2003] and Acemoglu and Johnson [2005].

Implication 2: The size of an economy's financial markets relative to its total output is increasing in the strength of its property rights protection.

This implication is consistent with the empirical findings of La Porta *et al.* [1997] and Acemoglu and Johnson [2005] who show (without controlling for possible morality

³¹ However, increased risk aversion does not necessarily lead to a higher growth rate of agent utility. Although agent payoffs grow at a higher rate with a lower β , agents also derive less satisfaction from their

effects) that countries with poorer property rights protection — e.g., with poorer investor protection — have smaller capital markets as a fraction of the economy’s Gross Domestic Product (GDP). Their findings apply to both equity and debt markets.

We will now discuss the empirical literature that demonstrates the importance of ethical disposition; morality can have an impact on economic behavior, property rights institutions, financial development and the rate of economic growth. The suggestion that a society’s ethical disposition may have an effect on agents’ economic activities that is independent from a country’s institutional structure is unique to our model. Adopting the view that religious beliefs may be associated with moral behavior, a possible proxy for morality is then the intensity of religious beliefs. Implications 3, 4 and 5 follow.³²

Implication 3: Religious agents are less likely to engage in appropriation and rent-seeking activities than non-religious agents.

Implication 3 is consistent with the empirical findings of Guiso, Sapienza and Zingales [2003]. After including a country-fixed effect (which absorbs the quality of institutions, among other things), Guiso, Sapienza and Zingales [2003] demonstrate that religious agents are less likely to engage in appropriation activities than non-religious agents. In other words, religion (or morality) has an effect on economic behavior that is independent from the incentive structure that the institutional framework may provide.

Implication 4: A greater emphasis on religious beliefs is associated with a higher rate of economic growth.

This implication is consistent with the empirical findings of Barro and McCleary [2003]. After controlling for possible institutional effects (such as the maintenance of rule of law or electoral rights) on growth, Barro and McCleary [2003] show that stronger religious beliefs are associated with a higher rate of economic growth.³³

increased payoffs. Therefore, the overall effect of β on the rate of utility growth is ambiguous.

³² Given that both stronger property rights institutions and a more favorable ethical disposition lead to less corruption, another implication of our model is that a society having less corruption is more likely to exhibit a higher rate of economic growth. This is consistent with the empirical findings of Mauro [1995].

³³ Barro and McCleary [2003] view religious beliefs — i.e., belief in an afterlife — as the principal output of the religion sector and church attendance as its input. They show that for a given level of church attendance, an increase in religious beliefs is associated with higher economic growth. In other words,

Implication 5: Stronger religious beliefs (as in Barro and McCleary [2003]) are associated with a more developed financial system.

This implication of our model has not been tested.

Another proxy for a society's ethical disposition may be related to the level of trust that others have towards its citizens. Presumably, a more moral society engenders more trust in its people. We thus arrive at implication 6.

Implication 6: A higher level of confidence in the morality of the citizens of a country (i.e., a higher level of trust toward citizens of a country) is associated with more external financing (i.e., more portfolio and direct investment in that country).

Implication 6 is consistent with the empirical results of Guiso, Sapienza and Zingales [2005]. After controlling for country-fixed effects (which absorb the quality of institutions, among other things), Guiso, Sapienza and Zingales [2005] offer evidence in support of this implication.

Another implication of our model is related to the effects of an external institutional intervention on a country's rate of economic growth. Our analysis suggests that when an external power exogenously imposes property rights institutions, the full effect on economic growth unfolds only after the next generation of agents enters the workforce, replacing the current generation. The full impact on the rate of economic growth may thus unfold only after several decades. This suggestion is unique to our analysis and complements existing theory, which only predicts a rather immediate effect of a property rights change. Implication 7 follows.

Implication 7: The full effect of an externally-imposed change in property rights institutions on a country's rate of economic growth unfolds over a course of several decades, rather than immediately.

religious productivity — religious output per unit of religious inputs — is associated with higher economic growth. This approach implicitly assumes that religious inputs, such as church attendance or the construction of cathedrals, are resources that are diverted from other more productive uses.

Implication 7 has not been tested in the empirical literature yet. It is consistent, however, with the pattern of development of some ex-communist countries. North Korea is a good example. Before 1950, the Soviet-backed communist regime imposed weak property rights in North Korea, while South Korea, a country with similar historical and cultural roots, adopted strong property rights institutions. As Figure 1 shows, although the Soviet-backed institutional change occurred before 1950, its full effect on the divergence between the growth rates of North and South Korea became apparent only in the early 1970s.

Implications 8 and 9 stem from our model's conclusions about the impact of risk aversion on morality and economic performance. For example, a possible proxy for risk aversion can be an economy's saving rate. Economists stress that individuals often save for precautionary purposes — they want to build up a reserve against unforeseen contingencies (Mankiw [2003]). For this reason, a higher degree of risk aversion leads to a higher saving rate in a society.

Implication 8: Countries with a higher degree of risk aversion among their citizens — for example, countries with a higher saving rate — tend to exhibit less corruption.

Implication 8 has not been tested. As we explain in the introduction, however, it may offer new insights into the East Asian “economic miracle.”

Implication 9: Countries with a higher degree of risk aversion among their citizens — for example, countries with a higher saving rate — tend to exhibit a higher rate of economic growth.

Implication 9 is a well-known observation (Mankiw [2003]). Our analysis provides a new reason as to why a high saving rate may be associated with a high rate of economic growth. In particular, a high saving rate is an indication of risk aversion, which leads to a more moral society and a higher rate of economic growth.

Finally, our model predicts a link between financial and economic development.

Implication 10: Countries with developed financial markets tend to exhibit higher rates of economic growth.

This implication is consistent with the empirical findings of King and Levine [1993a] and Levine and Zervos [1998] who show that financial development is robustly correlated with current and future economic growth. In our model, developed financial markets constitute a good predictor of growth because a moral equilibrium leads to both financial development and economic growth.

6. CONCLUSION

The paramount importance of property rights institutions for a society's well-being has been established by empirical research, but nevertheless is not fully understood in economic theory. We provide a simple theoretical framework for interpreting the recent seminal empirical studies on the role of institutions. Our analysis underscores the significance of morality in determining a country's institutional structure, economic prosperity, financial development and rate of economic growth; institutions are endogenous and emerge from a country's ethical disposition. In this way, our results are also consistent with another stream of empirical research which demonstrates the independent effects of morality on economic behavior.

In our model, the channel — financial transactions — through which morality affects economic activity is obviously only one particular example and others can be easily identified. However, our perspective does have the advantage of focusing on the widely studied agency problem between investors and entrepreneurs and viewing its prevalence as an important ethical measure of a society. Also, our analysis is limited to only one aspect of ethical behavior — clearly, a society's ethical disposition involves more than the type of agency problem on which we have focused. However, the benefit of this rather narrow approach is that it has enabled us to make concrete what we mean by moral and immoral behavior and to analyze the implications in a rigorous manner. In addition, the empirical literature has used measures of a society's ethical disposition — e.g. extent of corruption, intensity of religious beliefs — that readily relate to our example of morality.

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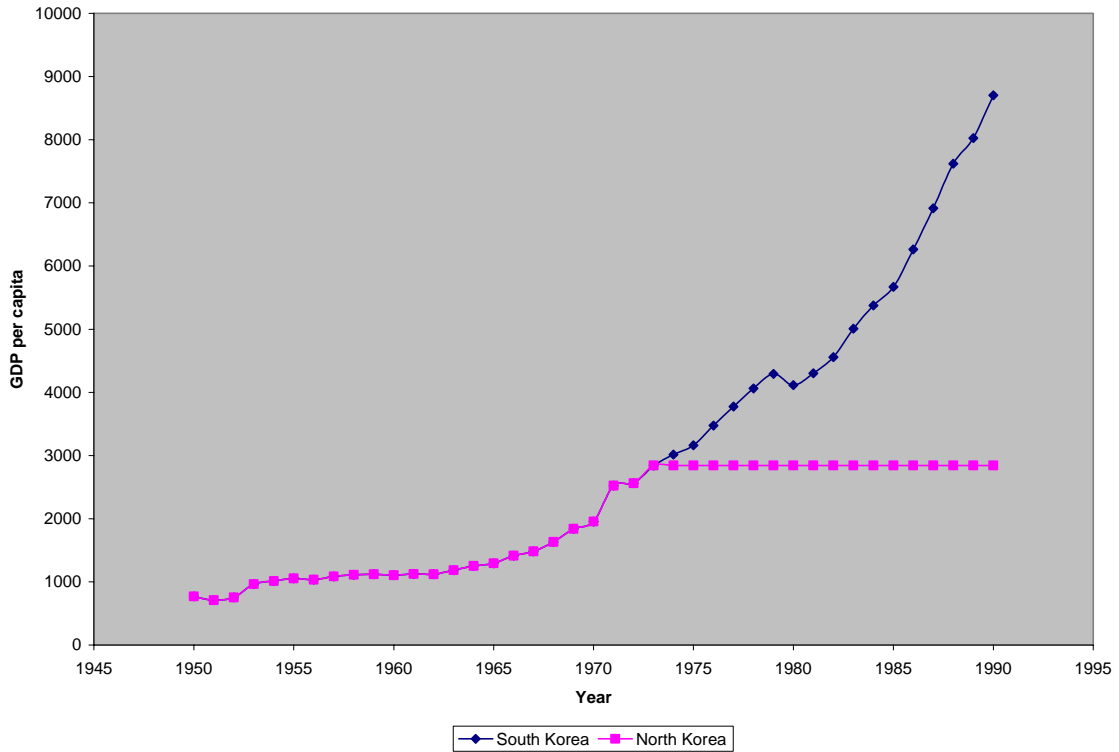


Figure 1: GDP Per Capita in North and South Korea.

Data Source: Maddison, Angus. *World Economy: Historical Statistics*, OECD, 2003.