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The Correlation between Human Capital and Morality and Its Effect on Economic Performance

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Abstract

This paper incorporates morality—defined as lower utility from consuming goods obtained through appropriative rather than productive activities—into a simple static general equilibrium model in which agents choose whether to be producers or appropriators. The authors analyze the relationship between the *correlation* between morality and human capital on the one hand, and aggregate economic performance on the other. They show that there is a main effect that tends to cause this relationship to be positive, and that there can be secondary effects that can either rein-force or oppose (or even overbalance) the main effect. They test the theory using the World Val-ues Survey as a source of proxies for morality. Using their preferred proxy, they find evidence that higher within-country correlation between morality and ability, holding constant the levels of morality and ability, increases per-capita income levels. Under the preferred specification, a one-standard-deviation increase in the correlation between morality and ability raises the log of per-capita income by about one-fourth of a standard deviation, equal to approximately $3,600 for the median income country in the sample. The results are robust to correcting for endogeneity and to changes in sample and specification. The results are mixed when the analysis uses alternative morality proxies, but the coefficient on the morality-ability correlation is still usually positive and statistically significant.

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The Correlation between Human Capital and Morality and Its Effect on Economic Performance: Theory and Evidence*

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I. Introduction

Some economic activities are productive, while others are appropriative. The performance of an economy is affected by the choices that agents make about whether they prefer to be producers or appropriators. These choices are influenced by the human capital endowments of economic agents (hereafter referred to as "ability"), and can also be influenced by the "morality" of agents, which we define as an aversion to consuming appropriated goods.[1] In this paper we examine the economic effects of cross-country differences in the within-country *correlation* between morality and ability, holding the aggregate *levels* of morality and ability constant.[2] Put another way, this paper is about whether and how a country's economic performance changes when the moral people in the economy are more likely also to be the talented people.

To see the main result of the model, imagine two countries, both with the same total morality and ability. Country A is dominated by a corrupt aristocracy, whose members tend to have high ability (they were sent to the best schools), but low morality (they were raised either not to notice that their activities are appropriative or not to care). Country B, in contrast, is dominated by a benevolent aristocracy, whose members also have high ability, but who are educated to have a sense of "noblesse oblige." That is, in Country A there is a low or negative correlation between morality and ability, whereas in Country B there is a strongly positive one.

[1] Economists have traditionally been wary of assuming that tastes (such as a taste for morality) vary across individuals, preferring to assume that tastes are homogeneous and to explain differences in outcomes as the result of differences in endowments, incentives, or constraints (Stigler and Becker, 1977). Naturally, an explanation based on heterogeneity of tastes is more justifiable (all else equal) the more firmly it is established empirically that tastes do in fact vary in the relevant ways. Caplan (2003) summarizes the psychology literature on this point, which appears to confirm that personalities can be categorized into distinct types, and that these types differ from each other significantly. Of particular importance for the present paper is the finding that, all else equal, criminals tend to have lower levels of certain personality factors than do other people. This is consistent with the common sense notion that some people are more moral than others, and lends support to the approach taken in this paper.

[2] It is trivial to show that performance is always increasing in the level of morality. The model also generates results regarding the effect of changes in the level of human capital, but discussion of this is confined to footnote 9 below.

Now consider what would happen if Country A became more like Country B. Some high-ability agents would be changed from low to high morality, and an equal number of low-ability agents would be changed from high to low morality. Any high-ability agent who was already a producer will remain a producer, so the increase in morality will have no effect. But those high-ability agents that started out as appropriators will get less utility from appropriation than before, which will cause some of them to switch and become producers. The effect on the low-ability agents will be the opposite, those that were already appropriators will remain appropriators, and some producers will switch and become appropriators.

Increasing the correlation between morality and ability causes some high-ability agents to switch into being producers, and causes some low-ability agents to switch out of being producers. This tends to cause the total amount of ability employed in productive activity to increase, which improves economic performance. This can be thought of as the "main" effect in our model, and it is larger the greater the difference in ability between high and low ability agents.

But the fact that the number of agents changed from high to low morality is equal to the number changed from low to high morality does not necessarily mean that the number of *switchers* from appropriation to production will be equal to the number of switchers from production to appropriation, or that the switchers in each direction will be identical in other relevant respects. These differences can generate secondary effects that can reinforce or oppose, and can even on net overbalance, the main effect.

The thought experiment in the model involves increasing the correlation between morality and ability within a country. But the same reasoning can be applied to cross-country comparisons. All else equal, the effect of increasing the correlation between morality and ability within a country is the same as the difference between the performances of countries with corresponding-

ly different correlations. The model predicts either an empirical finding that higher within-country correlation between morality and ability (controlling for the levels of both) has a positive effect on economic performance in a cross-country regression, or that over the relevant range the sector choices of high-ability agents are much less sensitive to morality than those of low-ability agents. We test the theory using the World Values Survey as a source of proxies for morality and borrowing the regression framework of Rodrik, Subramanian and Trebbi (2004). We show that higher within-country correlation between morality and ability, holding constant the levels of morality and ability, increases per capita income levels. This effect is both robust and of a substantial magnitude: using our preferred proxy and specification, a one-standard-deviation increase in the correlation raises the log of per-capita income by about one-fourth of a standard deviation, equal to approximately $3600 for the median-income country in our sample.

The remainder of the paper is organized as follows. Section II summarizes the relevant literature on morality (as we define it in this paper) and on the importance of how talent is allocated between productive and appropriative economic activities. Section III lays out our model and derives our theoretical results. Section IV contains our empirical results, including analysis of causality (that the morality-ability correlation causes high incomes and not the other way around), and of the robustness of the results to using alternative proxies for morality. Section V contains discussion and conclusions.

II. Previous Literature

A. Morality

For this paper to have relevance, it must be the case that at least some agents are willing to sacrifice income in order to do work that they regard as more moral. Casual empiricism suggests

that this is the case, though the question has received little formal study. The only directly relevant paper of which we are aware is by Frank (1996), who uses a number of datasets to show that people do indeed sacrifice very significant amounts of income to work in more moral jobs.

In modern societies where fertility decisions are not based primarily on the availability of basic necessities, it is possible for morality to persist in equilibrium, and to be inculcated in others, even though on average it reduces the moral agents' consumption. If morality can be inculcated, then the level and distribution of morality may be something that can be influenced by policy. Two papers that examine the inculcation of morality are Guttman, Nitzan and Spiegel (1992) and Francois and Zabojnik (2005).

B. Choice between Production and Appropriation

There are a number of papers that explore the causes of cross-country differences in the allocation of talent between production and appropriation. In some of these papers (Baumol, 1990; Murphy, Shleifer and Vishny, 1991), cross-country differences in the allocation of talent, and the resulting differences in economic performance, arise due to exogenous variation in technology and in the institutional environment. Other papers (Murphy, Shleifer and Vishny, 1993; Acemoglu, 1995) develop representative-agent models in which there are no exogenous differences across economies, but in which differences in economic performance still arise because the models have multiple equilibria. The present paper is more in the spirit of the former group of models; there are no multiple equilibria, and differences in cross-country performance arise due to exogenous differences in the model parameters.

In Grossman and Kim (2000), as in our paper, the choice between production and appropriation is influenced by morality.[3] In their model higher morality improves economic performance, and the level of morality evolves dynamically over time, with alternating periods of moral decay and moral "revivals." In their model, however, agents vary only in their level of morality. Our paper, in contrast, focuses on the interaction between morality and ability.

III. The Model

A. Endowments and Sector Choice

We assume a unit mass of atomistic agents. Each agent is endowed with general ability a_j which can be high or low (a_H or a_L), and with morality m_k (defined below), which can also be high or low (m_H or m_L). There are four types of agents, and all agents of a given type *jk* have the same ability and the same morality. The types are summarized as follows.

	m_L	m_H
a_L	Type *LL*	Type *LH*
a_H	Type *HL*	Type *HH*

The economy has two sectors: "productive" and "appropriative." Agents in the productive sector produce a consumption good (food), and agents in the appropriative sector produce an item that is used to effect a transfer of food from producers to themselves (crowbars for prying open locked granaries). Each agent joins one of the two sectors. There is no money, exchange, or joint production and there are no firms or institutions.

[3] There are a few other papers in broadly the same spirit. Aidt (2003) develops a model in which some honest bureaucrats refuse to accept bribes on principle. Noe and Rebello (1994) develop a model in which some "ethical" firm managers regard it as their duty to exert high effort even when monetary incentives are absent.

The maximum amount of food that an agent of ability a_j can produce is $p(a_j)$. Each agent i is endowed with an idiosyncratic ε_i, distributed according to $f(\cdot)$ on [0,1], which captures his or her level of productive sector talent, represented as the fraction of $p(a_j)$ that he or she is capable of producing. Similarly, the maximum number of crowbars that an agent of ability a_j can produce is $r(a_j)$, and each agent is endowed with a similarly defined idiosyncratic talent η_i, independently distributed according to $g(\cdot)$ on [0,1].

An agent i of ability a_j who joins the productive sector makes $\varepsilon_i p(a_j)$ units of food. Of this, she consumes $\alpha\varepsilon_i p(a_j)$ units, where $\alpha \in (0,1)$ is an (endogenous) parameter representing the fraction of food output that is not lost to appropriators. The utility received by an agent i of ability a_j who joins the productive sector is equal to:

(1*a*) $$u_{ij}^{p}(a_j, \varepsilon_i) = \alpha\varepsilon_i p(a_j)$$

Morality does not appear in (1*a*), because participation in the productive sector is not regarded as immoral, and so morality does not influence the utility received in that sector.

An agent of ability a_j who joins the appropriative sector makes $\eta_i r(a_j)$ crowbars, and consumes $\beta\eta_i r(a_j)$ units of food, where $\beta \geq 0$ is an (endogenous) parameter which represents the amount of food that an appropriator can seize with each crowbar. The utility received by an agent i of ability a_j and morality m_k who joins the appropriative sector is equal to:

(1*b*) $$u_{ijk}^{r}(a_j, m_k, \eta_i) = (1 - m_k)\beta\eta_i r(a_j)$$

The utility from joining the appropriative sector is equal to food consumption minus the psychic cost associated with earning one's living through appropriation. An agent for whom $m = 0$ is perfectly amoral, as his utility depends solely on food consumption. An agent for whom $m = 1$ is perfectly moral, as he receives no utility from participating in the appropriative sector.

An agent *i* of ability a_j and morality m_k chooses the productive sector if:

$$(2)\; u_{ij}^{p}(a_j,\varepsilon_i) > u_{ijk}^{r}(a_j,m_k,\eta_i) \Rightarrow \alpha\varepsilon_i p(a_j) > (1-m_k)\beta\eta_i r(a_j) \Rightarrow \frac{\varepsilon_i}{\eta_i} \equiv z_i > \frac{(1-m_k)[r(a_j)/p(a_j)]}{\frac{\alpha}{\beta}} \equiv T_{jk}$$

For each of the four types, there is a unique threshold level of the ratio $\varepsilon_i/\eta_i \equiv z_i$ such that an agent characterized by that level is indifferent between the two sectors. We refer to these thresholds as T_{jk}. The ratio z_i is distributed according to $h(\cdot)$ with support $[\underline{z}, \bar{z}]$.

B. Sector Output Functions

Total food output in the economy *P* is equal to:

$$(3)\; P = \pi_{LL}\int_{T_{LL}}^{\bar{z}} \varepsilon_i p(a_L)h(z_i)dz_i + \pi_{LH}\int_{T_{LH}}^{\bar{z}} \varepsilon_i p(a_L)h(z_i)dz_i + \pi_{HL}\int_{T_{HL}}^{\bar{z}} \varepsilon_i p(a_H)h(z_i)dz_i + \pi_{HH}\int_{T_{HH}}^{\bar{z}} \varepsilon_i p(a_H)h(z_i)dz_i$$

The π_{jk} represent the fraction of the mass of agents that is of type *jk* (i.e., is of ability a_j and of morality m_k). Note that *P* is a function of the T_{jk}, which in turn are functions of the endogenous variables α and β. Total crowbar output *R* is equal to:

$$(4)\; R = \pi_{LL}\int_{\underline{z}}^{T_{LL}} \eta_i r(a_L)h(z_i)dz_i + \pi_{LH}\int_{\underline{z}}^{T_{LH}} \eta_i r(a_L)h(z_i)dz_i + \pi_{HL}\int_{\underline{z}}^{T_{HL}} \eta_i r(a_H)h(z_i)dz_i + \pi_{HH}\int_{\underline{z}}^{T_{HH}} \eta_i r(a_H)h(z_i)dz_i$$

C. Appropriation Technology

We assume that all of the appropriated food is claimed by the appropriators, so that:

$$(5a)\qquad (1-\alpha)P = \beta R$$

Additionally, we assume that the appropriation technology is defined by:

$$(5b)\qquad \alpha = \frac{1}{1+\frac{\theta R}{P}}$$

Equation (5*b*) represents an appropriation technology similar to that used in Grossman and Kim (2000).[4] It has the property that $\alpha \in (0,1)$. It also has the property that α is decreasing in R/P: α is smaller when more crowbars are chasing less food. The parameter $\theta > 0$ determines the magnitude of this effect. Solving (5*a*) and (5*b*) for α and β:

(6*a*) $$\alpha = \frac{P}{P + \theta R}$$

(6*b*) $$\beta = \frac{\theta P}{P + \theta R}$$

Both α and β are increasing in P and decreasing in R: producers keep a larger fraction of their food output, and appropriators get more food per crowbar, when fewer crowbars are chasing more food. The benefit of choosing this functional form of the appropriation technology is that the ratio α/β is equal to $1/\theta$, which is an exogenous constant, even though α and β are each endogenously determined by the sector choices of all the agents in the economy. Substituting $1/\theta$ for α/β in (2) makes the T_{jk} thresholds exogenous as well. That is, the sector choice of any agent does not depend on the choices made by other agents.[5] While unrealistic, this simplifies the model and

[4] This appropriation technology has the property that α is the same for each producer regardless of her food output and β is the same for each appropriator regardless of his crowbar output. If every producer had the same food output and every appropriator had the same crowbar output, one would expect this to be true since every producer would have an equal probability of meeting (and losing their food to) an appropriator. In the present model, however, not every producer has the same food output, and not every appropriator has the same crowbar output. In this setting, there is no general result that α and β will be constants. Nevertheless, we retain the assumptions in (5*a*) and (5*b*) because they greatly simplify the analysis, and because there is no alternative assumption (tractable or otherwise) that is obviously superior. One (highly stylized) scenario that would generate a constant α and β would be as follows. Suppose that food is stored in grain elevators. If all elevators are the same size, then no appropriator will have any greater reason to attack one than another, so any particular unit of food (whether it is the 1st or the 100th unit of the producer who grew it) will have an equal probability of being appropriated. As long as the costs of using any particular sized elevator are the same across producers, one would expect to see a pooling equilibrium emerge in which everyone uses the same sized elevator. The reason is that anyone who uses an elevator size that attracts an above-average number of attacks will want to switch to the common elevator size. Similarly, if there were an elevator size that caused a below-average number of attacks, everyone else would want to switch to that size. Combining this assumption with an assumption of constant returns to scale in appropriation (i.e., two crowbars are exactly twice as good as one), generates a constant α and β.

[5] To see this, suppose an agent switched from appropriation to production. This would increase α (fewer crowbars chasing more food), and also increase β (for the same reason). In general, the ratio α/β could increase or decrease, but the assumed technology guarantees that it remains constant, which means that the T_{jk} thresholds would be unaf-

makes it possible to abstract from strategic sector choice decisions that are not central to the point of the paper.

D. Information and Timing

The only decision agents make is which sector to join, and each agent i bases this decision solely on whether z_i is higher or lower than the threshold value T_{jk} for his or her type.[6] Since we have shown above that α/β is equal to $1/\theta$, we can see from (2) that agents need only know their own z_i, their type, the value of the parameter θ, and the ratio $r(a_j)/p(a_j)$. All agents make their sector choices simultaneously.

E. Equilibrium

Equations (3), (4), (5*a*), and (5*b*) constitute a system of four equations and four endogenous variables (P, R, α, and β). An equilibrium is a set of values P^*, R^*, α^*, and β^* such that P^* and R^* reflect utility-maximizing behavior when $\alpha = \alpha^*$ and $\beta = \beta^*$, and such that α^* and β^* arise from the appropriation technology when $P = P^*$ and $R = R^*$. As discussed above, the appropriation technology has the property that α/β is equal to $1/\theta$, which means that the T_{jk} thresholds in (2) are exogenous constants that can be plugged into (3) and (4), generating expressions for P^* and R^* without needing to solve the system. These are not complete analytic solutions, as (3)

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fected, which in turn means that the switch would not affect the sector choice of any other agent. In contrast, other models such as Acemoglu (1995) and Murphy, Shleifer and Vishny (1993) have multiple equilibria because the relative returns to production and appropriation depend on how many producers and how many appropriators there are in the economy.

[6] The fact that P^* depends solely on the T_{jk} thresholds means that the only social cost of appropriative activities is the foregone food output of the appropriators. The social cost would be larger if appropriation itself, or defenses against appropriation, dissipated food. It would also be larger if the model included a choice between labor and leisure. In the latter case, appropriation would have the effect of a tax on food production; as long as the labor supply curve is upward-sloping in the relevant region, it would cause those agents who still become producers to work less, which would exacerbate the negative effects of appropriation beyond those discussed in this model.

contains ε_i and (4) contains η_i, whose distributions are not independent of $z_i \equiv \varepsilon_i/\eta_i$. However, they will be sufficient for our purposes below.

F. Theory Results

We next consider the effect of changes in the correlation between morality and ability. The correlation can be increased, while holding the aggregate levels of morality and ability constant, by changing a mass of random high-ability agents from low to high morality (replacing *HL* agents with *HH* agents), and changing an equal-sized mass of random low-ability agents from high to low morality (replacing *LH* agents with *LL* agents).[7] Changing an individual agent from low to high morality may have no effect on the agent's sector choice: the agent may have already been a producer before the change, or may prefer to be an appropriator even after the change. But those agents with a z_i between T_{HH} and T_{HL} will switch from appropriation to production, thereby increasing productive sector output P^*. Agents with a z_i between T_{LH} and T_{LL} will switch in the opposite direction. If the mass of agents changed in each direction is ρ, then the net change in the measure of agents employed in the productive sector will be:

$$\rho\left(\int_{T_{HH}}^{T_{HL}} h(z_i)dz_i - \int_{T_{LH}}^{T_{LL}} h(z_i)dz_i\right) \tag{7}$$

The expression in (7) is not generally equal to zero: just because the mass of agents with increased morality is equal to the mass of agents with decreased morality does not mean that the mass of *switchers* (i.e., the mass of agents between T_{HH} and T_{HL}) from appropriation to produc-

[7] An equivalent exercise would be to change a mass of random high-morality agents from low to high ability, and change a mass of equal measure of random low-morality agents from high to low ability. This exercise has the same effect as the one described in the text: they both involve adding *HH* and *LL* agents, and subtracting *LH* and *HL* agents. Also equivalent is to imagine that it were possible to inculcate morality, and that there were enough available resources to do so for one agent, and then to ask whether increasing the morality of a random high-ability agent has a larger or a smaller effect on food output than increasing the morality of a random low-ability agent.

tion is equal to the mass of switchers in the opposite direction (the mass of agents between T_{LH} and T_{LL}), or that the switchers in both directions will have the same distribution of ε_i.

The effect on P^* of increasing the correlation between morality and ability is equal to:

$$\rho\left(\int_{T_{HH}}^{T_{HL}} \varepsilon_i p(a_H) h(z_i) dz_i - \int_{T_{LH}}^{T_{LL}} \varepsilon_i p(a_L) h(z_i) dz_i\right) \tag{8}$$

This effect depends on three factors: (i) the difference between a_H and a_L; (ii) the mass of switchers in each direction (which depends on the distribution of z_i, and on the four T_{jk} thresholds); and (iii) the distribution of ε_i (which is not independent of z_i) among the switchers in both directions. Only (i) is unambiguous, which leads to the following propositions:

Proposition 1: All else equal, the effect on P^* of increasing the correlation between morality and ability is more positive or less negative the larger the difference between a_H and a_L.

Proof: Immediate from (8).

If we restrict the relationship between the production functions $p(a_j)$ and $r(a_j)$, we obtain an unambiguous result on the effect of increasing the correlation between morality and ability.

Proposition 2: If the ratio of appropriative sector output to productive sector output $r(a_j)/p(a_j)$ is independent of ability, then increasing the correlation between morality and ability unambiguously makes aggregate productive sector output P^* increase, regardless of the distribution of z_i.

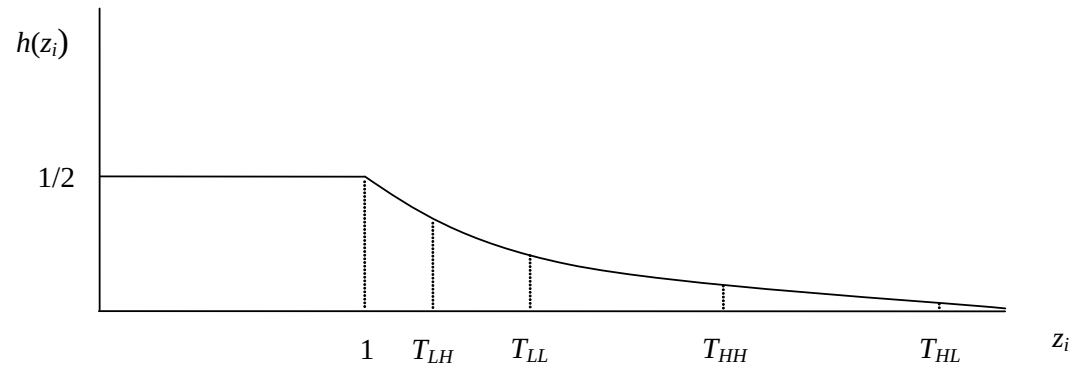
Proof: We see from (2) that if $r(a_j)/p(a_j)$ is independent of a_j, then $T_{LH} = T_{HH}$ and $T_{LL} = T_{HL}$, which means both that the mass of switchers is equal in both directions, and that the distribution of ε_i is the same among switchers in both directions, regardless of the distribution of z_i. It is immediate from (8) that this, combined with the fact that $a_H > a_L$, proves the result. □

The intuition behind these results is that one effect of increasing the correlation between morality and ability is that those agents whose increased morality induces them to switch from appropriation to production are of high ability, whereas those agents whose decreased morality induces them to switch in the opposite direction are of low ability, which tends to increase the total

amount of ability employed in the productive sector and hence increase P^*. We refer to this as the "main" effect in the model. This effect is stronger the larger the difference in ability between high and low ability agents. And if the mass of switchers and the distribution of ε_i are the same in both directions, then this is the only effect operating, and so P^* unambiguously increases.[8]

But it is not generally true that the mass of switchers or the distribution of ε_i among switchers is the same in both directions, which means that these secondary effects can be present. They can reinforce or oppose the main effect described above. If they reinforce it, then the result that increasing the correlation between morality and ability increases P^* is strengthened. If they oppose it, then the net effect becomes ambiguous. In the following example, the mass of switchers from appropriation to production is smaller than the mass of switchers in the opposite direction, and by enough that the net effect on P^* is negative.

Example: Assume that $f(\varepsilon_i)$ and $g(\eta_i)$ are each independently distributed on U[0,1]. The distribution of $z_i \equiv \varepsilon_i/\eta_i$ is ½ for $0 < z_i < 1$ and $1/2z_i^2$ for $z_i > 1$. If $r(a_j)/p(a_j)$ is increasing in a_j, then $T_{HL} - T_{HH} > T_{LL} - T_{LH}$, so the range of z_i characterizing switchers from appropriation to production is larger than the range characterizing switchers in the opposite direction. Nevertheless, if all four $T_{jk} > 1$, then the thin right tail of the distribution of z_i can cause the mass of switchers from appropriation to production to be smaller than the mass of switchers in the opposite direction. This is illustrated in the figure below.



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The fact $T_{HL} > T_{LL}$ and $T_{HH} > T_{LH}$ means that the z_i for switchers from appropriation to production will be higher than for switchers in the opposite direction. Since z_i and ε_i are positively correlated, this weighs against P^* decreasing. But it can still happen. The presence of ε_i in (8) means that this cannot be shown analytically, so we show it using a simple numerical analysis, which is described in the Theory Appendix below.

IV. Empirical Analysis

While the thought experiment in the model involves changing the correlation between morality and ability within a country, the same reasoning can be applied to cross-country comparisons. The main empirical prediction of the model is that all else equal countries with a higher correlation between morality and ability will have higher average incomes, except in those cases where sector choice decisions are much more sensitive to morality among low-ability agents than among high-ability agents.[9]

A. Operationalizing Ability and Morality

[9] A similar comparative statics result holds for an increase in total ability (holding morality constant). If the increase in ability has no effect on or reduces the threshold for joining the productive sector, then higher ability will increase food output. If the increase in ability raises the threshold for joining the productive sector, then the effect on food output is ambiguous. This is omitted from the text in the interest of brevity and because a similar result has already been shown by Murphy, Shleifer and Vishny (1991). The possibility that higher ability will not increase output is consistent with the conjecture of Pritchett (2001) that the empirical lack of a country-level relationship between schooling and output may be because that extra schooling is being diverted to appropriative ends. But other researchers such as Cohen and Soto (2007) and Barro and Sala-i-Martin (2004) have found this relationship to be positive. Naturally, none of these papers control for any measure of morality. In results presented below, we also find a positive effect for schooling, and (more originally) a positive effect for schooling's correlation with morality.

Providing convincing tests of the theory is challenging due to the difficulty of measuring morality, and to a lesser extent ability, across countries. A key variable in the model is the correlation between morality and ability among workers in a society, so it is necessary to find survey data covering numerous countries in a reasonably comparable way. The World Values Survey (WVS) project is the source that best fulfills these criteria. We identify plausible proxies for ability and morality in the WVS, compute country-level variables from them, and include them in an income-levels regression based on the specification of Rodrik, Subramanian and Trebbi (2004). Results are generally consistent with the main predictions of the theory.

The World Values Surveys have been conducted in more than 80 countries beginning in 1981, in five survey "waves" through 2008. Samples are designed to be nationally representative, with the number of respondent households ranging from several hundred in some cases to several thousand in others. The survey questionnaire was originally designed in part to measure differences across countries and over time in materialist and "post-materialist" values as societies modernized and became wealthier. The data have been used in hundreds of academic publications, mostly in other disciplines but also in economics (e.g. Knack and Keefer, 1997; Alesina and La Ferrara 2005).

The best available proxy for ability in the WVS is educational attainment. The Data Appendix lists the eight attainment categories from lowest to highest. We make one change in the WVS ordering, collapsing categories 4 and 5 because it is not clear whether respondents who have completed secondary education with a vocational emphasis have "more" (or less) education than those with an incomplete secondary education with a college preparatory emphasis.

Educational attainment is obviously an imperfect measure of ability. Some famously successful entrepreneurs even in wealthy countries do not have university degrees. For several reasons it

is correlated with ability (Griliches and Mason, 1972; Spence, 1973), however, and there is no more plausible proxy available in the WVS.

Measuring morality, defined as an aversion to earning a living through appropriative as opposed to productive work, is even more difficult. There are several survey questions in the WVS that are potentially relevant. In selecting our primary indicator of morality from among them, our first criterion was that the question pertain directly to work or employment choices. Our second criterion was that it must bear on the willingness to sacrifice income (or job-related leisure) to do work that may be regarded as more moral. No WVS question fully meets these two criteria, but the question that comes closest inquires about particular job characteristics that would be "most important" to the respondent if he/she "were looking for a job." Specifically, we construct a "morality" dummy coded 1 for respondents who place the highest value on "doing an important job which gives you a sense of accomplishment," and coded 0 for those who place greater value on high income, job security or likable co-workers.[10] The results we report below rely primarily on this morality proxy. However, in a subsequent section we present results for several alternative morality proxies from the WVS.

Following the theory, the empirical investigation is mainly concerned with identifying whether or not it matters for economic performance if workers with more ability are also more "moral." Therefore, the key independent variable in our analysis is the *correlation* of morality and ability among workers *within* each country.[11] In computing the correlation and in generating country-level aggregates for morality and ability, we drop all respondents not in the labor force

[10] See the Data Appendix for the complete survey question. If we measure morality more expansively as the share of respondents selecting "doing an important job which gives you a sense of accomplishment" as either their first or second priority among the four choices, the results reported in tables below change very little. The mean of this more expansively-defined variable is 40%, compared to 21% for the more restrictive definition based only on respondents' first choices. However, the two versions of the indicator are correlated at .95, and the ability-morality correlations computed using both versions are correlated at .86.

[11] Note we are *not* testing an *interaction* effect at the country level between morality and ability, as the theory does not imply that morality will matter more (or less) for economic performance in countries with more ability.

(i.e. students, retirees and homemakers; the unemployed are included). Morality is dichotomous, and ability is measured by a 7-point ordinal scale, so we compute Spearman's rather than Pearson's correlation coefficients.

The morality and ability indicators are both included in one or more surveys from the 3rd, 4th and 5th waves of the WVS in 74 countries.[12] For each of these three waves, the Data Appendix shows which of these 74 countries participated and the year in which the survey was conducted. There are 38 countries that participated in only one of the three waves. In 24 countries, surveys were conducted in two waves, and the other 12 participated in all three waves. With 122 total surveys in the 74 countries, the mean number per country is 1.75. The mean survey year is 2002.

Following Bjornskov (forthcoming) and others, we take the mean values of WVS variables for the 36 countries with multiple surveys, based on the premise that the within-country variation over time is small and measured with substantial error relative to the cross-country variation in the surveys. As Bjornskov (forthcoming) finds for interpersonal trust, morality and ability (and their correlations) appear to be fairly stable over time.

Summary statistics of our data are presented in Table 1. The mean level of morality is 21%, ranging from a low of 5% for Uganda to a high of 49% for Sweden. In general, developed countries rank higher on morality, but the value for Uganda's equally-poor neighbor Tanzania is 29%, and the Dominican Republic's 39% places it above the majority of developed countries.

For most countries, there is a positive but modest correlation between morality and ability. The correlation is negative but small in Uganda (-.04), Mali (-.10) and Tanzania (-.13). The mean correlation for the 74 countries is +.14, with a maximum of +.27 (for Czech Republic).

[12] The morality question was not included in the first two WVS waves (1981-84 and 1990-93). We drop several countries (including Andorra and Cyprus) with WVS data on ability and morality due to missing data on income, trade or other key variables in the analysis. Colombia is dropped because its survey included an additional response category for the morality indicator, so its value is not comparable to those of other countries.

The voluminous cross-country empirical literature on economic performance presents reflects no particular consensus on dependent variables (e.g. income growth rates or income levels) or on model specification. For simplicity and transparency, we adopt the recent and influential approach of Rodrik, Subramanian and Trebbi (2004), who analyze the "deep determinants" of per capita income levels. They compare the contributions of "institutions," geography and trade--acknowledging the complex inter-relationships among them--and conclude that "the quality of institutions trumps everything else" (p. 135). Glaeser et al. (2004) argue that "human capital is a more basic source of growth" than the institutional indicators used by RST and Acemoglu, Johnson and Robinson (2001). This argument fits our emphasis on ability, so we add it (measured by educational attainment) as a fourth "deep determinant" of income levels when testing the effects of morality and its correlation with ability.

We follow RST in measuring economic performance by the log of GDP per capita, adjusted for purchasing power parity. Their data are for 1995, but we update this to 2008, because our independent variables from the WVS are from 1995 and later.

B. Main Empirical Results

As discussed above, the "main" effect of the model predicts per-capita income to be increasing in the correlation between morality and ability. This prediction is overturned only if "secondary" effects are present, and on net work sufficiently strongly against the main effect, which seems unlikely. The theory can therefore be said to predict a positive relationship, with the caveat that if such a relationship were not found it would remain to investigate the magnitudes and directions of the secondary effects before concluding that the theory is invalid.

We first regress income on only our ability and morality proxies, in equation 2-1 of Table 2. At the respondent level, ability is measured by an ordinal scale, and we aggregated it to generate several interval-level measures based on different cut-points. Preliminary testing indicated that income was strongly and negatively related to the share of the labor force with no secondary schooling. Differentiating among higher levels of attainment (e.g. secondary versus post-secondary) provided little or no additional explanatory power, and had only trivial effects on the coefficient estimates for other variables of interest. For simplicity, we therefore measure ability in our regressions as the labor force share without any secondary schooling; this is the lowest achievement level on the seven-point ordinal scale we used in computing the Spearman correlations of morality and ability within countries.[13]

Morality and (low) ability are both highly significant in equation 2-1, and together explain more than half of the cross-country variation in income. Equation 2-2 adds the morality-ability correlation as a third regressor, and its coefficient is also highly significant with the hypothesized positive sign. Coefficients and t-values for morality and ability decline somewhat in absolute value relative to equation 2-1, but they remain highly significant. The three regressors collectively explain 62% of the variation in income. Converted to standard deviation units, the three coefficients are very similar in magnitude: -.33 (ability), +.34 (morality), and .36 (morality-ability correlation).

Equation 2-3 reports results in our sample of countries for the basic RST specification, using their main indicators of geography (distance in degrees of latitude from the equator), trade (exports plus imports as a share of GDP in 2006), and institutions ("Rule of Law" for 2006 from the

[13] We also tested the country-level mean of the full 7-point ordinal-level scale. It provides a marginal improvement in explaining the cross-country variation in incomes, but again with only trivial effects on the coefficients of other variables in the analysis. We therefore report results using an aggregate indicator of ability that does not violate the properties of the underlying scale, namely the share of the labor force with no secondary schooling.

Worldwide Governance Indicators). Equation 2-3 includes only these three regressors, and is estimated for the same 74-country sample included in equations 2-1 and 2-2. Collectively the three RST regressors explain 63% of the variation in income, approximately the same as the three WVS regressors in equation 2-2. Geography and institutions but not trade are strongly significant, and in the expected direction. These results are very similar to those reported in Table 2 of RST, despite a much different sample of countries, suggesting there is nothing peculiar about this 74-country sample for which WVS data are available. As shown in Table 3, there are fairly strong correlations among some of these six regressors (three from the WVS and three from RST). Ability (human capital), morality and the morality-ability correlation are all significantly higher in countries located further from the equator and with a stronger "rule of law."

Unsurprisingly, the strong relationships of some of these variables with income in equations 2-2 and 2-3 weaken somewhat when all six are included together in equation 2-4. Relative to the previous results, in equation 2-4 coefficients for morality and distance from equator are cut roughly in half, but morality remains significant at the .10 level and distance remains significant at the .05 level. Coefficients for ability, rule of law and the morality-ability correlation are reduced by roughly one-third, but all remain significant at the .01 level.[14] Collectively the six regressors explain 77% of the variation in income.

Based on equation 2-4, an increase of .1 (equal to about one quarter of the range exhibited in the sample) in the correlation between morality and ability is associated with a 36% increase in per capita income. Each percentage-point increase in morality is associated with a 1.7% increase in income. Each percentage-point increase in the labor force share with no secondary schooling

[14] Although structural modeling of these interrelationships is beyond the scope of this paper, these results are consistent with the interpretation that geography and institutions as measured by RST affect income in part through their effects on schooling, morality and on the correlation between them. Alternatively, "institutions" (i.e. the rule of law index) may be measuring, in part, morality and its correlation with ability.

is associated with a 2% drop in income. Converting all variables into standard-deviation units, each one standard deviation increase in the correlation between morality and ability is associated with an increase in the log of per capita income of one-fourth of a standard deviation, approximately equal to $3600 for the median-income country in our sample.[15] This standardized coefficient of .25 is comparable to that for schooling (-.23 standard deviations), and larger than for geography or morality (both at .16), and openness (.08). Only rule of law (.38) has a larger standardized coefficient).

The ability and morality variables are computed from survey data, with different sample sizes in each country's surveys. Values estimated from larger samples will tend to be more precise, so the observations for those countries contain more information. In equation 2-5, we report estimates using weighted least squares, with observations weighted by the number of WVS respondents. Results from WLS estimation differ only trivially from the OLS results in equation 2-4.

Equation 2-6 shows how results change when the most influential observation in favor of our key hypothesis is dropped. Figure 1 depicts the partial correlation between the dependent variable and the morality-ability correlation from equation 2-4. Thus, the slope of the least-squares line imposed on the figure equals the regression coefficient 3.616. Tanzania is clearly the most influential case in our favor. When this observation is dropped in equation 2-6, the coefficient of the morality-ability correlation declines from 3.62 to 2.85, but remains significant at the .01 level. Two other relatively influential cases are Uganda and Kyrgyzstan.[16] When they and Tanzania

[15] The standard deviation of (log of) per capita income in the sample is 1.13, so a standard deviation increase in the morality-ability correlation will be associated with an increase of about .28 (=1.13 x .25) in the log of per capita income. This .28 estimate coincides with the difference in log of per capita income between the two median-income countries in our sample, Bulgaria (9.33) and Russia (9.61). In dollar terms, the difference in incomes between these two countries is $3658 (= 14, 917 - 11, 259). Because income is in logs, the marginal effect in terms of dollars will be greater (lower) for countries at higher (lower) income levels. For countries at the 25th percentile of the income distribution in our sample (such as Georgia or Guatemala), the marginal effect is about $1400, and for countries at the 75th percentile (such as Israel or Korea) it is about $8000.

[16] Mali is also a negative outlier on the ability-morality correlation, but it lies above the regression line.

are dropped, the coefficient declines further to 1.63, but remains significant at the .10 level. The oil exporters Trinidad and Venezuela are the largest positive outliers, with income higher than predicted given their morality-ability correlations, but dropping Trinidad strengthens rather than weakens the relationship, and dropping Venezuela makes no difference.[17]

In Equation 2-7, we follow RST in controlling for three additional geographic variables associated with "natural" openness to trade. Controlling for them implies that the direct measure of trade will better reflect the impact of policies favoring trade. The trade coefficient declines relative to its value in the base specification in equation 2-4. Among the additional geography variables, only the landlocked dummy achieves significance, at the .10 level.[18] Inclusion of these variables has little effect on results for other regressors. Adding dummies for the 19 high-income OECD countries and the 23 "transition" economies of Eastern Europe and the former Soviet Union similarly has only trivial effects on results for the morality and other variables.

C. Endogeneity

Estimates reported in Table 2 potentially reflect two-way causation. For example, in higher-income countries workers may have a lower marginal benefit to further increases in their income and can better afford to indulge any tastes for doing more moral work. If so, the morality coefficient could be biased upwards. A variation of this argument would suggest an upward bias in the morality-ability coefficient. Suppose that in low income countries few workers, even among the more able, can afford to indulge any tastes for doing moral work. The morality-ability correlation

[17] These and other results described below are not reported in tables but are available on request from the authors.

[18] Frankel and Romer (1999) construct predicted trade from these geography variables and from geographic distances between potential trading partners. They did not construct predicted trade share for many of the transition economies, and inclusion of this variable in our tests reduces the sample size from 74 to 56. Nevertheless, coefficients for morality and the ability-morality correlation remain positive and significant when it is added, and the predicted trade share itself is not significant.

will be near zero in those countries. In high income countries more workers, particularly among the more able, can afford to trade off income against moral or other psychic considerations when choosing a job. The morality-ability correlation will be positive in those countries.

We address these endogeneity concerns in several ways. First, as explained in more detail below, we exploit time series variation in the data, by modifying the sample or alternatively by modifying the specification. Subsequently, we instrument for the morality variables using 2SLS and limited-information maximum likelihood (LIML) in Table 5. Coefficients for the morality-ability correlation variable remain positive and highly significant in these tests, while results for the morality proxy are mixed.

Income is measured for 2008, while the morality variables are measured from surveys conducted between 1995 and 2008 but with variation among countries. The potential for estimates to reflect reverse causation from income to morality is reduced somewhat by measuring morality further back in time, e.g. for 1995 instead of for 2008. Accordingly, in equation 4-1 of Table 4 we drop the 19 observations for which morality is measured using only the 5th WVS survey wave (2005-2008). This change reduces the mean survey year represented in the data by two years, from 2002 to 2000. The model specification is from equation 2-4, based on RST but with the morality variables added. The coefficient for the morality proxy in equation 4-1 is insignificant and only one-third as large as in equation 2-4, consistent with the view that the latter estimate mostly reflects reverse causation from income to morality. The coefficient on the morality-ability correlation remains positive and highly significant, however, in equation 4-1. Moreover, its coefficient is one-third larger in equation 4-1 than in equation 2-4.

In equation 4-2 we drop an additional 13 observations with a mean survey year greater than 2001. This change reduces the mean survey year by one additional year, from 2000 to 1999. Re-

sults are very similar to those in equation 4-1. The morality-ability correlation remains highly significant for this smaller sample.

In equation 4-3 we measure ability (schooling), morality, and the morality-ability correlation using only the 1995-1998 WVS surveys. For this sample, the mean year for surveys used is 1996. This change not only limits the sample size – by dropping countries included only in the later survey waves – but arguably introduces more random measurement error for most of the remaining countries, by throwing away information from the subsequent survey waves. Nevertheless, schooling, morality and the morality-ability correlation are all significant with the expected signs in equation 4-3.

Equation 4-4 includes all 74 countries, but measures the morality variables using only the earliest available WVS wave for each country. Equation 4-5 is similar in other respects but measures the morality variables using only the most recent available WVS. (For 38 countries these are the same values in both tests.) If causation runs mostly from income to morality, the morality variables should have more explanatory power in equation 4-5 than in 4-4. However, the R^2 is marginally higher in 4-4 (.77) than in 4-5 (.76). The coefficient for the initial-wave morality-ability correlation is also somewhat higher (in 4-4) than for the final-wave. The reverse is true for the morality proxy: its coefficient is larger when measured using final-wave data.

In results not reported in Table 4 for space reasons, we include both sets of morality variables together, measured using the initial-wave and final-wave WVS. For the morality proxy, only the final-wave variable is significant (at the .10 level). For the morality-ability correlation, only the initial-wave variable is significant (at the .05 level). These results, and those in Table 4, are consistent with the view that any causal relationship between income and the morality-ability correlation runs from the latter to the former. For the morality proxy, on the other hand, the results are

suggestive of at least some reverse causation from income to morality. These tests each throw away some of the WVS data, however, and (as mentioned above) we agree with Bjornskov (forthcoming) and others that the within-country variation over time is a highly noisy measure of actual change. In Table 5 therefore we adopt an alternative (and more conventional) approach by instrumenting for the potentially endogenous morality variables.[19] Results for the morality-ability correlation from these tests are strikingly similar to those presented in Table 4, while results for the morality proxy are more favorable (i.e. more positive and consistently significant).

For instruments we rely primarily on religious composition of the population, using data from McCleary and Barro (2006). There are several precedents in the literature. La Porta et al. (1997, 1999) find that interpersonal trust and tax compliance are lower, and corruption higher, in countries with more adherents of "hierarchical" religions (Catholic, Eastern Orthodox, or Muslim). Zak and Knack (2001) instrument for interpersonal trust with these religious composition variables in cross-country growth regressions. Knack (2002) uses a broader set of religious composition variables in instrumenting for several "social capital" indicators in analyzing determinants of government performance across the American states. Building on Weber (1905), McCleary (2007) and McCleary and Barro (2006) describe how some of the major religions foster traits such as honesty and charity, and attitudes toward work. Religious composition potentially provides a relevant and valid set of instruments for our morality variables. They are relevant instruments if "differences in motivational mechanisms" across the major religions explain much of the cross-country variation in the morality variables, and they may be valid as "it is not

[19] Rule of law and trade openness have been treated as endogenous in some studies, including RST (2004). We treat them as exogenous for three reasons. First, with more endogenous regressors it is more difficult to find a set of instruments that successfully discriminates among them. Second, a test of "weak instruments" telling us whether they discriminate among them sufficiently is available only for the case of three or fewer endogenous variables. Third, in general fitted values from first-stage regressions are less effective as "control" variables in testing more central hypotheses (Dollar and Kraay, 2003; Angrist and Pischke, 2010), in this case for the morality variables.

clear that one religion is more supportive than another of economic productivity" (McCleary, 2007). We report formal tests of relevance and validity below.

We supplement religious composition with one additional exogenous instrument, from the "State Antiquity Index" project of Bockstette, Chanda and Putterman (2002). Specifically, we use their estimate of (the log of) number of years of statehood from 1 AD to 1950 AD.[20] These authors suggest that a more extensive history of statehood "may support the development of attitudes consistent with bureaucratic discipline and hierarchical control," but also fosters a common language and sense of identity, facilitating trust and harmonious social interaction.

When instrumenting for multiple endogenous variables, it is important that the excluded instruments not be related in too similar a way to both the morality proxy and the morality-ability correlation. A weak instruments problem can be present even if they have strong explanatory power in both first-stage regressions, if the fitted values from those regressions are highly correlated with each other. In other words, the excluded instruments must discriminate reasonably well between the two endogenous variables. We report formal tests for this weak instruments problem below. With few exceptions, theory does not provide much guidance as to which instruments might predict the morality-ability correlation but not the morality proxy. According to McCleary (2007), upper-caste Hindu men have a duty to "earn a living responsibly," suggesting percent Hindu may be positively correlated with the morality-ability correlation. In general however our strategy is simply to let the data determine whether the instruments can discriminate sufficiently between the two endogenous variables.

[20] Coding is based on three key questions for territory corresponding to the boundaries of modern nations: (1) was there a government above the tribal level? (2) Was the government locally based or foreign (e.g. a colony)? (3) How much of the modern territory was ruled by this government? We follow Bockstette, Chanda and Putterman (2002) in using their version of this variable that discounts by 5% to reduce the weight of periods in the more remote past.

Equations 5-1 and 5-2 (in Table 5) respectively report first-stage 2SLS results for the morality proxy and the morality-ability correlation. Several religious-composition variables were collapsed, based on preliminary results. Specifically, percent Protestant and percent Catholic were combined into "Western Christian," as results for them were very similar, for both endogenous regressors. Omitted categories are Buddhist, "other religion," and "non-religious," as these likewise showed similar (non-significant) results in both first-stage regressions, in preliminary tests.

Several instruments are positive and significant in both equations 5-1 and 5-2. These include percent Western Christian, percent Jewish, and percent "other Eastern religions." Percent Muslim is significant (with a positive coefficient) only in the morality regression, and percent "other Christian" and years of statehood are significant (and positive) only in the morality-ability regression. The explanatory power of the instruments is reasonably good, as indicated by the partial R^2s for the excluded instruments of .22 and .27.[21] More importantly for instrument relevance in this case of multiple endogenous variables, Shea's (1997) partial R^2s (which adjust for correlation between the two fitted values) are also relatively high, at .21 and .26. Angrist and Pischke (2009) provide first-stage F statistics for weak- and under-identification where there are multiple endogenous variables. For both of our first-stage regressions, the null hypotheses of weak and under identification are rejected at the 05 level.

Stock and Yogo (2005) provide two alternative formal criteria for weak instruments: (1) the maximal bias of the IV estimator relative to the OLS estimator exceeds some threshold (e.g. 10, 20 or 30%); (2) the maximal size bias of Wald tests on IV parameters (under the null of weak instruments) exceeds some threshold. They provide critical values for the relevant F statistics. The Kleibergen-Paap F statistic for weak identification (robust to the presence of heteroskedasticity) in our 2SLS regression is 11.77 (see second-stage 2SLS equation, 5-3). This value exceeds

[21] While there is no clear threshold, we note that Dollar & Kraay refer to a partial R^2 of .25 as "respectable."

the 10.22 critical value for 10% maximal relative IV bias, and the 10.41 critical value for maximal IV size bias in Wald tests. Overall the evidence is fairly strong in rejecting the null of weak instruments. Nevertheless, we not only report results from 2SLS in Table 5, but also for an alternative IV estimator, that is more robust to the presence of weak instruments, namely LIML (limited information maximum likelihood). In contrast to 2SLS estimates, LIML estimates are consistent under a weaker set of assumptions on instrument strength (Chao and Swanson, 2005).

Second-stage results from 2SLS are presented in equation 5-3. The morality-ability coefficient is positive and significant at the .01 level as in OLS, and almost twice as large (6.59 compared to 3.62) than in the similar OLS specification of equation 2-4. The morality proxy is positive and significant at the .05 level. Its coefficient is almost three times as large as its OLS counterpart (.047, compared to .017 in equation 2-4), perhaps reflecting a correction for attenuation bias associated with measurement error in our morality indicator.

Both morality and the morality-ability correlation also exhibit positive and significant coefficients in LIML estimation in equation 5-4, with magnitudes slightly larger than in 2SLS. In both 2SLS and LIML, the null hypothesis that the instruments are valid is supported; p-values for the relevant test of overidentifying restrictions are .77 and .79 respectively. As with the OLS results, the 2SLS and LIML results change very little if we weight countries by their number of survey respondents or if we drop Tanzania.

D. Alternative Morality Proxies in the WVS

In Table 6 we report results for other possible morality proxies included in the WVS. Several other questions in the WVS pertain to work-related "values," but they focus on the decision to

work or not work,[22] and provide no information on what aspects of work provide utility or disutility to respondents. Nor do the questions require respondents to make tradeoffs among values, as in our preferred question. We therefore consider them less apt for our purpose, but in the interests of transparency we report results for several of these questions. For space reasons, results are shown only for the morality variables, not the control variables, and we focus on their sign and statistical significance and do not interpret coefficient magnitudes.

Column 6-1 of Table 6 reports results for a question on whether respondents agree that "work is a duty to society." The model specifications are similar to those in equations 2-4 (OLS), 5-3 (2SLS), and 5-4 (LIML), but replacing our primary morality indicator, and its correlation with ability, with others based on the duty-to-work question. Results are mixed in column 6-1. The morality proxy (duty to work) is not significant in OLS, 2SLS or LIML. Its correlation with ability has a negative coefficient that is highly significant in OLS and marginally significant in 2SLS and LIML. The overidentification test rejects instrument validity for 2SLS, however. Another WVS question asks respondents to agree or disagree that "it's humiliating to receive money without having to work for it." The percentage of respondents who agree is not significantly related to economic performance; neither is its correlation with ability.

Other questions we considered in the WVS are unrelated to work choices or attitudes, but may still capture "morality" as we have defined it. Some are from a list of qualities that respondents may select as being important for encouraging children "to learn at home." Columns 6-2 and 6-3 respectively report results for two of these: "feeling of responsibility" and "tolerance and respect for other people." The relevant coefficients based on these questions are consistently positive, as hypothesized, in OLS, 2SLS and LIML. Three out of four coefficients are significant at

[22] These questions are commonly used in testing hypotheses about the "Protestant work ethic" (Geser, 2009; McCleary and Barro, 2006).

the .10 level in OLS, and at the .05 or .01 level in 2SLS. In LIML, the morality-ability correlation (based on the "tolerance and respect" question in column 6-3) is significant at the .01 level, but the other three coefficients are not significant at conventional levels.

"Unselfishness" was another item on this list of important qualities for children to learn. Results are not reported in the table for space reasons, but the morality-ability correlations were positive and significant in 2SLS (at .01) and in LIML (at .05). The OLS coefficients were insignificant, as were the IV coefficients for the morality proxy (percentage of respondents identifying unselfishness as an important quality).

Column 6-4 reports results for an additional alternative morality indicator. It is based on a WVS question asking respondents to choose their first priority from a list of four social objectives: "a stable economy," "progress toward a society in which ideas count more than money," "the fight against crime," and "progress toward a less impersonal and more humane society." We took the last option as the "moral" one, and this definition of morality, while having nothing to do with employment choices, comports closely with the everyday meaning of the word. In column 6-4, the morality proxy itself is not significant in OLS, 2SLS, or LIML, but its correlation with ability is positive and highly significant in all three tests.[23]

A final set of potentially relevant questions in the WVS ask about whether certain anti-social behaviors (e.g., cheating on taxes, avoiding a fare on public transport, or taking a bribe) can ever be justified. The vast majority of respondents indicate these behaviors are never justifiable, and many respondents may simply be providing the socially desirable answer, whether or not it is consistent with their behavior. Furthermore, all of these measures involve attitudes towards cheating the government, which may not correspond closely to the producer-appropriator distinction, particularly in countries where the government is regarded as highly corrupt. In any event,

[23] Sample sizes vary in Table 6 as certain questions were asked only in certain WVS waves.

if these questions are substituted for our morality proxy, they produce insignificant results (not reported in tables for space reasons).

E. Morality and Appropriation

The theory in Section III is not the only possible explanation for the empirical links between morality (and the morality-ability correlation) with economic performance, shown in Tables 2-6. The theory's relevance arguably would be more convincing supported if morality, and the morality-ability correlation, were also linked with lower levels of "appropriative" activities. It is difficult to measure the extent of "appropriation" in a reliable way at the country level, but in Table 7 we present some evidence from surveys of business executives, conducted by the World Economic Forum (2010) and available for 73 of the 74 countries in our main sample (Belarus is the missing country).

Surveys include about 100 respondents (and firms) per country. Samples are designed to be at least roughly representative by sector. Small firms are included, but larger firms and firms trading across borders are overrepresented. Survey responses for most questions are on a 1-7 ordinal scale, and the data made available by the WEF are country-level means of these ordinal scales, with higher values indicating "better" scores.

There are likely many important appropriative activities not addressed in the WEF's questionnaire. Moreover, we do not attempt to identify and control for the numerous other variables that might influence the extent of "appropriation." The regressions presented in Table 7 should therefore be interpreted as merely suggestive; they simply test whether or not certain appropriative activities seem to be larger problems in countries where morality is more prevalent among workers, and where morality is especially prevalent among workers with greater ability.

For three of the four types of appropriation measured, we do find the hypothesized link. Equation 7-1 shows that in countries where morality and the morality-ability correlation are higher, survey respondents are significantly more confident that lost wallets will be returned with their contents intact. Regression coefficients are standardized for comparison across equations, so a 1-unit increase in the morality proxy is associated with an increase of .38 standard deviations in the 1-7 scale on returned wallets.

The wallets question pertains to individuals in the country taking advantage of each other. A second question asks about ethical behavior of firms. Equation 7-2 shows this question is positively and significantly related to the morality proxy, while the coefficient on the morality-ability correlation is positive but not significant. A third question addresses the impact of crime and violence on business, in equation 7-3. Both regressors have positive but insignificant coefficients. The dependent variable in equation 7-4 is an index of the frequency of bribe solicitation encountered in dealing with public officials. Both morality and the morality-ability correlation have positive and significant coefficients in this test.

Overall, these tests using a range of indicators on appropriative activities produce evidence consistent with the implications of the theory. However, this limited analysis tells us very little about what sorts of appropriative activities are most damaging to economic performance. Crime and violence may have particularly damaging effects, for example, even though they are not strongly correlated with our morality indicators.

V. Discussion and Conclusion

This paper investigates the relationship between the correlation between morality and human capital one the one hand (where morality is defined as disutility of consuming appropriated

goods), and economic performance on the other. The theory model predicts that this correlation will be positively related to performance, unless at the margin the sector choices of high-ability agents are sufficiently less responsive to morality than are those of low ability agents, in which case this relationship can be zero or even negative. It also predicts that the effect on performance is larger (or less negative) the greater the difference between low and high ability agents.

In the theory model, we define "appropriation" as pure theft, agents engaged in appropriative activity produce nothing and spend their time working to transfer the output of productive people to themselves. In reality not all appropriative activities are equally damaging, some involve a pure transfer, so that the resulting social cost is only the foregone productive output of the appropriators, while others, such as violent crime, can be much worse. The harmfulness of available appropriative activities may vary across countries, which could confound our results if the countries with high correlations between morality and ability are also characterized by relatively mild forms of appropriation. However, while our data do not allow us to control for this directly, we do control for measures of institutional quality, which may to some extent capture this.

Our empirical analysis finds that the within-country correlation between morality and ability has a very large effect on per-capita incomes. Under our preferred specification, a one-standard-deviation increase in the correlation between morality and ability raises the log of per capita income by about one-fourth of a standard deviation, approximately equal to $3600 for the median-income country in our sample. Put differently, an increase of .1 in the correlation between morality and ability is associated with a 36% increase in per capita income. Correcting for endogeneity the effect is even larger. Using alternative proxies for morality produces mixed results, but the coefficient on the morality-ability correlation is usually positive and statistically significant. Finally, we also find evidence that the level of morality has a large effect on per-capital incomes.

That the estimated effect is so large may seem surprising, but in our view it is not. Baumol (1990) and Murphy, Shleifer and Vishny (1991), have showed that the allocation of talent to productive rather than appropriative ends is a first-order determinant of economic performance. This suggests that anything that significantly influences the decisions of agents to be producers rather than appropriators is likely to be important. And though there is little direct evidence on the subject (Frank, 1996, is the only relevant paper of which we are aware) it seems quite plausible that morality is sometimes an important determinant of the decision to engage in productive vs. appropriate activities. And since the decisions of high-ability people are of particular importance, the correlation between morality and ability seems likely to be important as well.

Finding a good proxy for morality as defined in our model is difficult, and there is room for doubt as to whether our preferred measure of morality (or any of our alternative measures) captures it well. But whether or not our empirical results can be regarded as a clean test of the theory, we believe that they are picking up something important. Our "morality" variables have significant explanatory power even when they are included in regressions alongside the standard variables emphasized by other researchers, which we regard as evidence that values, and particularly the values held by the high-ability people in a society, somehow strongly influence economic choices, and that these choices powerfully influence economic performance. Better understanding the precise nature of that influence promises to be a fruitful subject for future research.

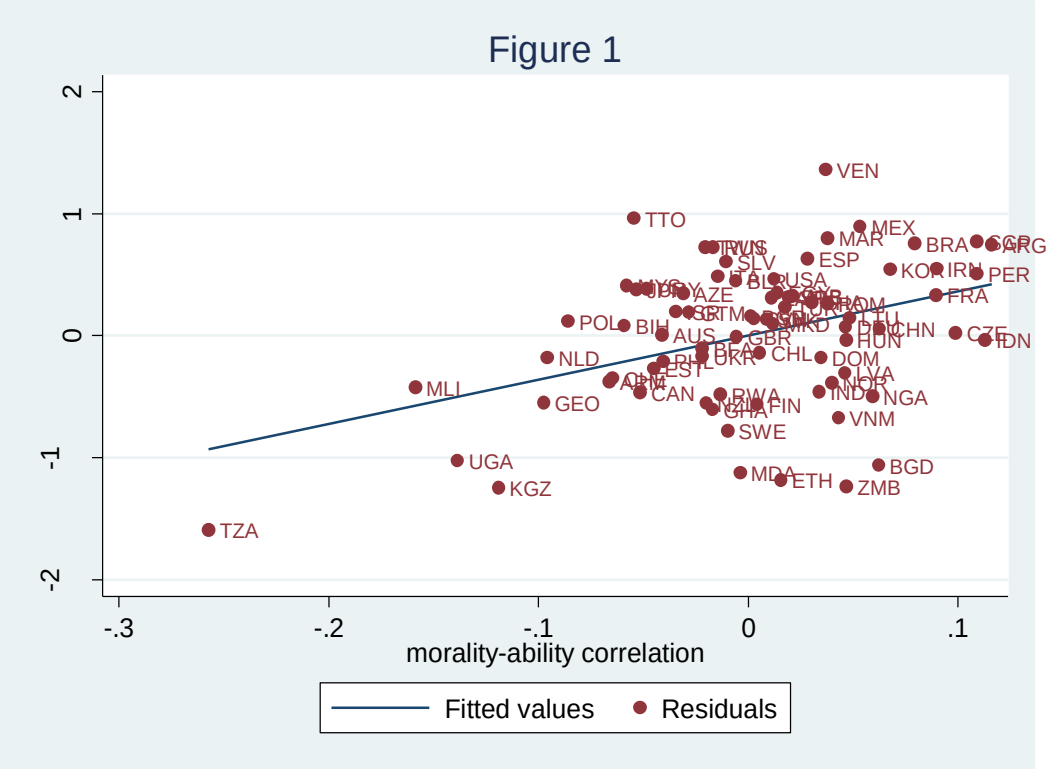
Figure 1
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morality-ability correlation
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KGZ
TZA
Fitted values
Residuals

Table 1: Summary statistics

	Mean	Std. dev.	Min.	Max.
Per capita GDP (PPP-adj.) 2008	15207	12807	802	49711
Log per capita GDP	9.144	1.134	6.687	10.814
No secondary schooling (proportion)	.088	.131	0	.643
Morality (%)	21.27	10.72	5.02	48.64
Correlation morality-schooling	.1387	.076	-.130	.268
Geography (degrees latitude from equator)	32.99	17.93	1	64
Institutions ("Rule of law" from WGI)	.150	.967	-1.38	2.00
Trade (exports + imports as share of GDP)	89.54	58.25	25.83	456.65
Log of trade	4.359	.498	3.252	6.124

Table 2: Basic regressions

Equation number	2-1	2-2	2-3	2-4	2-5	2-6	2-7
Model variant	Ability & morality	Morality-ability cor-relation	"Institutions rule" variables	Morality & institutions	Weighted Least Squares	Tanzania dropped	Additional geography variables
No secondary schooling (%)	-3.798***	-2.906***		-2.012***	-1.981***	-2.221***	-1.846***
	(-4.49)	(-3.57)		(-3.31)	(-2.69)	(-3.24)	(-3.25)
Morality	0.048***	0.036***		0.017*	0.015*	0.020**	0.017**
	(6.31)	(4.63)		(1.94)	(1.73)	(2.20)	(2.06)
Morality-ability correlation		5.334***		3.616***	3.679***	2.845***	3.472***
		(3.77)		(3.71)	(3.97)	(2.68)	(3.35)
Distance from equator			0.021***	0.010**	0.011**	0.009*	0.012**
			(3.60)	(2.07)	(2.12)	(1.80)	(2.06)
trade share of GDP (log)			0.171	0.184	0.064	0.171	0.131
			(0.94)	(1.24)	(0.39)	(1.15)	(0.72)
Rule of law index			0.669***	0.449***	0.413***	0.453***	0.428***
			(8.01)	(4.75)	(4.39)	(4.77)	(4.36)
Log of population							-0.019
							(-0.23)
Log of land area							-0.028
							(-0.039)
Landlocked							-0.309*
							(-1.81)
Constant	8.463	7.889	7.610	7.246	7.826	7.424	8.173
	(36.87)	(30.79)	(9.44)	(9.24)	(9.62)	(9.19)	(6.01)
R^2	.52	.62	.63	.77	.75	.77	.77
Observations	74	74	74	74	74	73	74
Mean dep. var.	9.14	9.14	9.14	9.14	9.14	9.17	9.14

Dependent variable is log of 2008 GDP per capita (PPP-adjusted). Test statistics (from robust standard errors) are in parentheses. A *,** and *** respectively indicate significance at .10, .05 and .01 levels for two-tailed tests.

Table 3: Inter-correlations among regressors for 74-country main sample

	(1)	(2)	(3)	(4)	(5)
1. Distance from equator					
2. Trade/GDP	0.21				
3. Rule of law	0.44	0.15			
4. No secondary schooling	-0.48	-0.26	-0.27		
5. Morality	0.30	-0.14	0.58	-0.31	
6. Morality-ability correlation	0.35	0.08	0.42	-0.38	0.38

Table 4: Endogeneity checks

Equation number	4-1	4-2	4-3	4-4	4-5
variation	Obs. from wave 5 only dropped	Obs. with mean survey year > 2001 dropped	WVS 1995-1998 only	Initial WVS	Final WVS
No secondary schooling (%)	-1.603**	-3.841*	-4.410***	-2.260***	-1.947***
	(-2.23)	(-1.84)	(-2.75)	(-4.13)	(-2.73)
Morality	0.005	0.005	0.046***	0.012	0.015**
	(0.60)	(0.52)	(3.22)	(1.41)	(2.00)
Morality-ability correlation	4.797***	4.908***	2.597**	3.432***	3.010***
	(4.61)	(3.08)	(2.16)	(3.73)	(3.01)
Distance from Equator	0.008	0.005	0.007	0.010*	0.012**
	(1.53)	(0.48)	(0.85)	(1.98)	(2.26)
Trade share of GDP (log)	0.010	-0.004	-0.205	0.178	0.144
	(0.06)	(-0.02)	(-1.27)	(1.21)	(0.97)
Rule of law index	0.479***	0.408***	0.439***	0.467***	0.484***
	(4.45)	(3.12)	(5.19)	(4.93)	(5.17)
Constant	8.154	8.453	9.694	7.399	7.526
	(10.46)	(8.00)	(16.94)	(9.55)	(9.56)
R^2	.75	.73	.73	.77	.76
Observations	55	42	45	74	74
Mean dep. var.	9.32	9.31	9.41	9.14	9.14

Dependent variable is log of 2008 GDP per capita (PPP-adjusted). Test statistics (from robust standard errors) are in parentheses. A *,** and *** respectively indicate significance at .10, .05 and .01 levels for two-tailed tests.

Table 5: 2SLS and LIML regressions

Equation number	5-1	5-2	5-3	5-4
dependent variable	Morality	Morality-ability correlation	Log GDP per capita	Log GDP per capita
	2SLS (1st)	2SLS (1st)	2SLS (2nd)	LIML
No secondary schooling	-16.429**	-0.013	-1.018*	-0.790
(% of labor force)	(-2.12)	(-0.74)	(-1.62)	(-1.12)
Distance from equator	0.099	0.002*	0.009*	0.009
	(1.22)	(1.81)	(1.63)	(1.47)
Trade share of GDP (ln)	-4.917***	-0.013	0.390**	0.444**
	(-3.17)	(-0.74)	(2.07)	(2.01)
Rule of law	3.593**	-0.002	0.192	0.129
	(2.55)	(-0.16)	(1.31)	(0.72)
Morality			0.047**	0.055**
			(2.45)	(2.19)
Morality-ability correlation			6.593***	7.118***
			(3.24)	(2.77)
Western Christian % 1970	13.744***	0.120***		
	(3.96)	(2.67)		
Orthodox Christian % 1970	1.481	0.065		
	(0.30)	(1.45)		
Other Christian % 1970	0.154	0.212*		
	(0.01)	(1.82)		
Jewish % 1970	22.913***	0.095*		
	(6.26)	(1.92)		
Muslim % 1970	9.659**	0.048		
	(2.03)	(1.07)		
Hindu % 1970	2.259	0.121**		
	(0.38)	(2.34)		
Other Eastern % 1970	19.179**	0.360***		
	(2.07)	(2.66)		
Years of statehood (log)	-2.605	0.040**		
	(-1.39)	(2.11)		
Constant	46.665	-0.184	5.306	4.823
	(3.13)	(-1.07)	(4.70)	(3.50)
Centered R^2	.56	.42	.69	.69
Mean dependent variable	21.3	.14	9.14	9.14
Partial R^2 of excluded instruments	.22	.27	--	--
Shea partial R^2	.21	.26	--	--
Angrist-Pischke weak-ID p value	.0001	.024	--	--
Angrist-Pischke under-ID p value	.0001	.006	--	--
Kleibergen-Paap Wald rk F	--	--	11.77	11.77
Over-identification test p value	--	--	0.77	0.79

Test statistics (from robust standard errors) are in parentheses. A *,** and *** respectively indicate significance at .10, .05 and .01 levels for two-tailed tests. Number of observations is 74.

Table 6: Alternative morality proxies

Column #	6-1	6-2	6-3	6-4
Morality proxy	Work is duty to society	Child quality: responsibility	Child quality: tolerance & respect	Progress toward more humane society
OLS				
Morality	-0.755	1.238*	0.565	0.886
	(-1.26)	(1.96)	(0.72)	(1.06)
Morality-ability correlation	-3.460***	1.585*	1.496*	3.953***
	(-3.53)	(1.84)	(1.71)	(3.54)
No. observations	72	84	84	76
2SLS				
Morality	0.115	3.075**	1.924	0.293
	(0.05)	(2.04)	(1.21)	(0.15)
Morality-ability correlation	-3.319*	8.566**	6.380***	8.161***
	(-1.81)	(2.40)	(2.93)	(3.59)
Overid p value	.02	.65	.43	.41
LIML				
Morality	0.570	2.799	2.803	-0.243
	(0.11)	(1.06)	(1.11)	(-0.09)
Morality-ability correlation	-5.816*	14.822	8.485***	9.209***
	(-1.74)	(1.48)	(2.58)	(3.12)
Overid p value	.44	.92	.58	.48

Dependent variable is log of GDP per capita (PPP-adjusted), 2008. Test statistics (from robust standard errors) are in parentheses. A * ,** and *** respectively indicate significance at .10, .05 and .01 levels for two-tailed tests. OLS models use the specification of Table 2, equation 2-4 but with different proxies for morality as indicated in the column headings. 2SLS and LIML follow the specification of Table 5. Results are shown only for morality variables for space reasons, but complete results are available from authors on request.

Table 7: Morality and appropriation

Equation number	7-1	7-2	7-3	7-4
Dep. Var.	Wallets returned	Firms Behave Ethically	Business costs of crime	Bribe Frequency
Morality	0.38***	0.55***	0.09	0.49***
	(3.36)	(5.43)	(0.91)	(5.33)
Morality-ability correlation	0.27***	0.12	0.12	0.22***
	(2.60)	(1.17)	(1.14)	(2.18)
Constant	2.68	2.82	4.31	2.74
	(10.43)	(12.79)	(17.27)	(11.60)
R^2	.30	.37	.03	.37
Mean, dep. var.	4.01	4.27	4.73	4.35

Dependent variables are from the "Executive Opinion Survey" (World Economic Forum, 2010). Survey questions are printed below. Regression coefficients are standardized. Test statistics (from robust standard errors) are in parentheses. A *,** and *** respectively indicate significance at .10, .05 and .01 levels for two-tailed tests. N = 73.

7-1
In your country, if someone loses a purse or wallet containing US$100, and it is found by a neighbor, how likely is it to be returned with the money in it? 1 = Very unlikely, 7 = Very likely

7-2
How would you compare the corporate ethics (ethical behaviour in interactions with public officials, politicians and other enterprises) of firms in your country with those of other countries in the world? 1 = Among the worst in the world, 7 = Among the best in the world

7-3
To what extent does the incidence of crime and violence impose costs on businesses in your country? 1 = Significant costs, 7 = No costs

7-4
In your country, how common is it for firms to make undocumented extra payments or bribes connected with the following:

a. Imports and exports? 1 = Very common, 7 = Never occurs
b. Public utilities (e.g. telephone or electricity)?
c. Annual tax payments?
d. Awarding of public contracts and licenses?
e. Obtaining favorable judicial decisions?

Survey Questions

Ability proxy from the World Value Surveys: educational attainment

What is the highest education level that you have attained?

1. No formal education or incomplete primary school
2. Complete primary school
3. Incomplete secondary school: technical/vocational type
4. Complete secondary school: technical/vocational type
5. Incomplete secondary: university-preparatory type
6. Complete secondary: university-preparatory type
7. Some university-level education, without degree
8. University-level education, with degree

Morality proxy from the World Value Surveys: important aspects of jobs

Now I would like to ask you something about the things which would seem to you, personally, most important if you were looking for a job. Here are some of the things many people take into account in relation to their work. Regardless of whether you're actually looking for a job, which one would you, personally, place first if you were looking for a job?

1. A good income so that you do not have any worries about money
2. A safe job with no risk of closing down or unemployment
3. Working with people you like
4. Doing an important job which gives you a feeling of accomplishment

Theory Appendix

Suppose $p(a_j) = a_j$ and $r(a_j)/p(a_j) = a_j^2$. If we could ignore ε_i, it would be straightforward to show that increasing the correlation between morality and ability would cause P^* to decrease.

$$\int_{\theta(1-m_H)a_H^2}^{\theta(1-m_L)a_H^2} \frac{a_H}{2z_i^2}\,dz_i - \int_{\theta(1-m_H)a_L^2}^{\theta(1-m_L)a_L^2} \frac{a_L}{2z_i^2}\,dz_i = -\frac{(a_H - a_L)(m_H - m_L)}{2a_H a_L (m_H - 1)(m_L - 1)\theta} < 0$$

However, the fact that average ε_i is higher among switchers from appropriation to production than among switchers in the opposite direction means that ε_i cannot be ignored. To incorporate ε_i, we performed a simple numerical simulation. We generated observations on 40,000 agents (10,000 for each type), each with independent random draws on U[0,1] for ε_i and for η_i.[24] We then randomly changed 5,000 agents from *HL* to *HH*, and changed 5,000 agents from *LH* to *LL*. Of these, 537 switched from appropriation to production, and 1,239 switched in the opposite direction. This difference in the number of switchers is large enough to make the net effect on P^* negative: total productive sector output falls from 16,730 to 16,161.

[24] The parameter values were as follows: $a_H = 3$, $a_L = 2$, $m_H = 3/4$, $m_L = 1/2$, and $\theta = 1$.

Data Appendix

74-country sample

Country	WVS3	WVS4	WVS5	Morality	Correlation
Albania	1998	2002	.	7.62	0.14
Argentina	1995	1999	2006	21.16	0.24
Armenia	1997	.	.	20.53	0.07
Australia	1995	.	2005	40.01	0.16
Azerbaijan	1997			5.72	0.09
Bangladesh	1996	2002		15.55	0.17
Belarus	1996			17.49	0.12
Bosnia and Herzegovina	1998	2001		5.28	0.06
Brazil	1997		2006	28.20	0.20
Bulgaria	1997		2006	10.55	0.14
Burkina Faso		.	2007	8.81	0.03
Canada		2000	2006	43.11	0.16
Chile	1996	2000	2005	18.65	0.16
China	1995	2001	2007	21.85	0.18
Czech Republic	1998			24.44	0.27
Dominican Republic	1996			39.38	0.18
Egypt, Arab Rep.			2008	8.82	0.11
El Salvador	1999			20.46	0.09
Estonia	1996			17.71	0.12
Ethiopia			2007	6.35	0.10
Finland	1996		2005	36.06	0.22
France			2006	26.45	0.26
Georgia			2008	14.23	0.03
Germany	1997		2006	21.26	0.23
Ghana			2007	8.06	0.06
Guatemala			2005	21.93	0.08
Hungary	1998			14.15	0.21
India	1995	2001	2006	11.98	0.14
Indonesia			2006	16.26	0.22
Iran, Islamic Rep.			2007	31.27	0.22
Israel		2001		36.50	0.14
Italy			2005	33.64	0.16
Japan		2000	2005	26.67	0.13
Korea, Rep.	1996	2001	2005	17.54	0.22
Kyrgyz Republic		2003		22.41	0.01
Latvia	1996			24.82	0.22
Lithuania	1997			10.17	0.20
Macedonia, FYR	1998	2001		13.41	0.14

Malaysia			2006	9.74	0.07
Mali			2007	14.07	-0.10
Mexico	1996	2000	2005	26.08	0.17
Moldova	1996	2002	2006	13.48	0.13
Morocco		2001	2007	16.27	0.09
Netherlands			2006	32.75	0.10
New Zealand	1998			40.54	0.18
Nigeria	1995			22.14	0.16
Norway	1996			47.90	0.26
Peru	1996	2001	2008	26.37	0.23
Philippines	1996	2001		13.10	0.06
Poland			2005	17.95	0.07
Romania	1998		2005	13.62	0.17
Russian Federation	1995		2006	13.47	0.12
Rwanda			2007	16.08	0.05
Serbia	1996	2001	2006	17.96	0.15
Singapore		2002		22.69	0.26
Slovak Republic	1998			20.79	0.17
Slovenia	1995		2005	30.11	0.18
South Africa		2001	2007	14.45	0.13
Spain	1995	2000	2007	20.15	0.19
Sweden	1996		2006	48.64	0.21
Switzerland	1996		2007	43.00	0.14
Taiwan, China	1994		2006	21.93	0.13
Tanzania		2001		28.90	-0.13
Thailand			2007	6.73	0.14
Trinidad and Tobago			2006	33.72	0.09
Turkey	1996		2007	23.19	0.16
Uganda		2001		5.02	-0.04
Ukraine	1996		2006	15.77	0.11
United Kingdom			2006	33.94	0.18
United States	1995	1999	2006	34.74	0.20
Uruguay	1996		2006	10.11	0.08
Venezuela, RB	1996	2000		21.40	0.14
Vietnam		2001	2006	13.11	0.15
Zambia			2007	15.34	0.16

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