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TRUST AND REGULATION: ADDRESSING A CULTURAL BIAS

by Paolo Pinotti*

Abstract

Cultural traits shape both the scope and the consequences of government intervention. Failing to account for cultural differences may therefore bias the estimated effects of regulation. This paper investigates the direction and the magnitude of this bias, from both a theoretical and an empirical point of view. It presents a simple model in which agents differ in terms of trust and trustworthiness, and average trust predicts average trustworthiness across countries. Entrepreneurial activity by the untrustworthy imposes negative externalities on the whole economy and burdensome entry regulations may lower these externalities at the cost of limiting economic activity by all agents. The model delivers two main predictions: within each country, preferences for regulations depend negatively on individual trust; across countries, lower trustworthiness drives higher levels of unofficial activity, negative externalities and government regulation, thus inducing a positive spurious correlation between all these variables. Evidence from individual level and cross-country data is consistent with these implications of the model. In particular, it suggests that a large part of the previously estimated negative effects of regulation can be attributed to omitted variation in cultural traits.

JEL Classification: L51, Z10, D02, K42.
Keywords: trust, regulations, unofficial economy, externalities.

Contents

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1 Introduction*

Government intervention is often blamed for entailing large economic inefficiencies. In particular, burdensome regulation of economic activity may distort the efficient allocation of resources by driving individuals and firms out of the official markets and into the informal sector (Johnson et al., 1998; Friedman et al., 2000; Schneider and Enste, 2000; Djankov et al., 2002). Most importantly, regulation also seems ineffective in preventing or correcting market failures. Available empirical evidence suggests that, on average, greater regulation is not associated with lower negative externalities across countries (Djankov et al., 2002).

These findings are consistent with public choice theories which consider regulation a purely rent-seeking device benefiting a restricted group of insiders (bureaucrats, politicians and industry incumbents) at the expense of the other agents in the economy (Tullock, 1967; Stigler, 1971; Peltzman, 1976). On the other hand, while in every country the insiders represent only a small fraction of the population, a much larger share would support greater government intervention. Recent survey evidence shows that, in a large sample of countries, about half of the people believe that the government should actually *increase* control over firms; see Figure 1. Most importantly, this fraction is much lower among bureaucrats and politicians, which is strongly at odds with rent-seeking models of regulation.[1]

This paper offers an alternative explanation that can reconcile the existence of positive excess demand for government intervention by individuals at large within each country with the empirical relationship between regulations and market failures that is observed across countries. This explanation hinges crucially on within- and between-country variation in two cultural traits, namely trust and trustworthiness. In particular, the first contribution of this paper is to show that, within each economy, the individual demand for regulation depends negatively on trust towards others. This relationship has far-reaching implications for the empirical pattern of regulation and market failures across countries characterized by a different degree of (average) trustworthiness. In particular, if average trustworthiness is negatively related to the incidence of market failures and if average trust predicts average trustworthiness across countries, then omitted variation in trustworthiness will bias the estimated effect of regulation on market failures upwards. The second contribution of this paper is thus to address the importance of this bias by explicitly incorporating heterogeneity in trust and trustworthiness into the analysis.

Preliminary evidence presented in the next section suggests that the bias induced

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[1] These results refer to a sample of 37,222 individuals from 32 countries interviewed during the period 1999-2002. The questionnaire and the data are described in greater detail in the next sections.

by omitted variation in culture is significant. After controlling for differences in trust, regulation is *not* related any more to the size of the unofficial sector and it is *negatively and significantly* related to the level of negative externalities (as proxied by water pollution). These findings are not in contrast with public choice theories of government intervention, in that the supply of regulation could well respond to the predatory motives emphasized by previous literature. On the demand side, however, they suggest that pressures for regulation are driven (among other things) by market failures occurring in the first place. This view is in line with the public interest theory of regulation initiated by Pigou (1938), according to which government intervention provides a (second best) solution to market inefficiencies (see also Banerjee, 1997; Acemoglu and Verdier, 2000). As a matter of fact, all countries impose pervasive regulations in those sectors characterized to a greater extent by negative externalities, natural monopolies, incomplete information and moral hazard (e.g. public utilities, professional services and the healthcare sector).

Culture enters this framework by influencing both the risk of market failures and the individual beliefs about such risks. With respect to the first issue, some cultural traits may prevent individuals from taking advantage of market imperfections at the expense of other agents, even when it would be optimal to do so from an economic point of view. While this is a departure from the standard *homo economicus* assumption, it is a widely accepted one. In particular, both experimental and non-experimental evidence show that elements of the cultural sphere such as moral values, religious beliefs and social norms may induce individuals to privilege social outcomes over their own private economic interests. Cultural tendencies towards cooperation have been alternatively referred to in the literature as civicness, generalized (as opposed to limited) morality, social capital or, especially in experimental economics, *trustworthiness* (for a recent survey, see Tabellini, 2008).

It is even more uncontroversial in the literature that individual trust reflects, to some extent, expectations about others' trustworthiness. In particular, several papers characterize trust as a mixture of rational beliefs about trustworthiness and behavioral components such as risk preferences and betrayal aversion (Barr, 2003; Bohnet and Zeckhauser, 2004; Bohnet et al., 2008; Fehr, 2008).[2] Therefore, individuals with lower trust would predict on average a higher propensity by the other individuals in the economy to take advantage of market failures; if the demand for government regulation is motivated (at least in part) by concerns for market failures, these same individuals should then prefer more government intervention.

Section 3 frames this idea into a simple model with heterogeneity in individual values and beliefs. In particular, some agents are trustworthy and never take advantage of market imperfections, while the others do so whenever it is in their economic interest. In particular, untrustworthy entrepreneurs exert negative externalities on the rest of the economy by adopting cheaper (but polluting) technologies. Trust is simply the subjective

[2]For a different view see Glaeser et al. (2000), according to whom individual trust reflects one's own (rather than others') trustworthiness.

belief about the fraction of trustworthy agents in the population.

Entry regulations impose an upfront (wasteful) cost on all entrants in the market. This cost depends on entrepreneurial ability. Since less efficient producers also have the greatest incentives (whenever they are untrustworthy) to adopt cheaper technologies, regulation acts as a screening device in a way analogous to Banerjee (1997). Indeed, regulation effectively screens entrants in the market, but it does so inefficiently for two main reasons. First, the untrustworthy producers averted from the official market may still operate unofficially; if they choose to do so, however, they must limit their size, which in turn also reduces the equilibrium level of negative externalities. Second, regulation imposes a burden on all producers, including the trustworthy ones.

The expected costs and benefits of regulations differ across agents according to their beliefs about the incidence of untrustworthy producers. In particular, trustful agents predict fewer market failures in the case of no regulation so that, other things equal, they demand less of it. In Section 4 I test this empirical implication of the model on individual data from the World Values Survey. Individual-level estimates allow to control for country-specific factors simply by including country fixed effects, which considerably reduces the scope for omitted variable and endogeneity bias. Also, difference-in-difference estimates across countries relate the trust-driven component of the individual demand for regulation to economic and institutional characteristics at the country level. Overall, I find that trust has a robust, negative effect on individual preferences for regulation, this effect being greater in countries where market failures are more widespread and the bureaucracy is less corrupt and more efficient.

Finally, in Section 5 I examine the implications of these findings for the cross-country pattern of regulations and market failures. The main model implication in this respect is that a lower incidence of trustworthiness drives higher levels of unofficial activity, negative externalities and government regulations (through trust), thus inducing a positive (spurious) correlation between all these variables. To take this into account, I explicitly control for average trust (as a predictor of average trustworthiness) when estimating the effect of regulations on unofficial activity and negative externalities. Indeed, the empirical evidence confirms that keeping constant (across countries) the level of average trust considerably weakens the negative effects of regulations relative to previous estimates.

This paper contributes to a large body of research, initiated by Putnam (1993) and Fukuyama (1995), investigating the effect of trust on economic activity.[3] In particular, Aghion et al. (2008) and Algan and Cahuc (2009) emphasize the interplay between culture and formal institutions, focusing in particular on labor market regulations. I contribute to this strand of literature by investigating the relationship between trust and entry regulations, both at the micro and macro level. The paper that comes closest to mine is Aghion et al. (2009), who also estimate a negative relationship between trust and entry

[3] An important antecedent to this literature is Arrow (1972), who remarked that "much of the economic backwardness in the world can be explained by the lack of mutual confidence". For a recent review see Tabellini (2008)

regulations. However, they do not examine the implications of this finding for the empirical evidence on the effects of regulation. My contribution in this respect is to show that omitted variation in cultural traits may bias previous estimates of such effects because of the correlation existing between trust and other economic outcomes affected by regulation, like unofficial activity.[4]

2 Data and preliminary evidence

This section introduces some of the measures of regulation and culture that will be used throughout the paper and reviews some previous findings about the relationship between regulations and market failures.

2.1 Regulation and market failures

Unbundling and measuring institutions is never an easy task. This is especially true for regulations, due to the extreme variability of formal and informal regulatory practices around the world. In an extremely influential paper, Djankov et al. (2002) proposed to measure entry regulations by the number of procedures required to start a new business. Such procedures include "obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions with relevant authorities"; they range from opening a bank account to scheduling sanitary inspections to the production plants. Since its introduction, this indicator has been updated yearly on behalf of the World Bank's Doing Business project.[5]

While any measure of regulations has its own shortcomings, the Doing Business indicator has the advantage of being available and roughly comparable for almost all countries in the world. Since its introduction, it has been extensively used to empirically evaluate the effects of regulations. In the same paper, in fact, Djankov et al. (2002) examine the correlation between regulations and some measures of market failure. Two such measures are the (estimated) size of the informal sector and the level of water pollution, as measured by the emissions of kilograms of organic pollutant per day per worker. The results are shown in the top graphs of Figure 2. Heavier regulations seem associated with worse outcomes in both respects, the relationship being particularly strong and statistically significant in the case of unofficial activity. Djankov et al. (2002) interpret these findings as evidence in favor of public choice theories of regulation.

2.2 Trust towards others

Cultural traits such as moral values, beliefs and social norms vary widely both within and across countries. The World Values Survey (WVS hereafter) represents a formidable at-

[4] La Porta et al. (1997), Slemrod (2002) and Lassen (2007) also find that the size of the informal sector depends, negatively, on trust.

[5] Arrunada (2007) presents a critique of the Doing Business indicators, while Woodruff (2006) provides a more general discussion of the issues involved in the measurement of institutions.

tempt to provide an adequate account of such heterogeneity by the means of international questionnaires collecting detailed individual data along several dimensions (economic, social, cultural, etc.) for more than 200,000 people in 83 countries.[6] The results of this survey deliver, among other things, a measure of individual trust towards others. Question A165 of the survey asks: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". I define a binary variable *trust* equal to 1 if the answer was "Most people can be trusted" and 0 otherwise. This is by far the most widely adopted measure of trust existing in the literature; examples include Knack and Keefer (1997), Guiso et al. (2006), Tabellini (2005) and Aghion et al. (2009). Since all other variables refer to the 1990s, I combined data from the second and third wave of the WVS (which span the periods 1990-1993 and 1994-1999, respectively) to obtain a cross-country measure of average trust.

It turns out that trust is negatively associated with entry regulations across countries; see Figure 3. If trust also reflects, negatively, the average propensity of (other) individuals in the economy to take advantage of market imperfections, then omitted variation in trust and trustworthiness could drive part of the (positive) correlation between regulations and market failures. Unfortunately, reliable measures of trustworthiness, allowing to verify its relationship with average trust, are not easily comparable across countries. For instance, data about blood donations and voting turnout, which capture the propensity of individuals to privilege social over private interests, could depend on the development of the non-profit sector and on the electoral system, respectively, both of which may be also correlated with regulations. Still, these same measures are more easily comparable across regions within the same country. In particular, Guiso et al. (2004) have used blood donations and voting turnout at referenda to measure differences in social capital across Italian regions. Both measures are indeed positively and significantly correlated with average trust across regions (the correlation coefficient is 0.38 for blood donations and 0.48 for voting turnout) as well as strongly correlated with each other (correlation equal to 0.63). While it is not possible to conclude that such correlations are actually due to the fact that trust predicts trustworthiness, this evidence suggests nevertheless that trust may be a proxy for (unobserved) average trustworthiness. Therefore, partialing out the effect of trust on both regulations and market failures should control, at least in part, for differences in trustworthiness across countries. After doing this, heavier regulations are no longer associated anymore with worse outcomes; see the bottom graphs in Figure 2. My interpretation of this finding is that culture is both an important determinant of regulations and a confounding factor in previous estimates of their effects.

[6] Throughout this paper I will refer to version v.20060423 of the database (FOUR-WAVE INTEGRATED DATA FILE, 1981-2004), which is available at http://www.worldvaluessurvey.org/. See the documentation available therein for an exhaustive description of the survey.

3 The model

Consider an economy populated by a continuum of (infinitesimal) agents with total mass 1. All agents can work as employees, in which case they earn a wage standardized to 0, or they can set up a firm and become entrepreneurs. Production costs depend on both the technology adopted and entrepreneurial ability. Technologies differ in terms of emissions of negative externalities (think of pollution). Dirty technologies do not require any investment by the entrepreneur but emit a high level of externalities, equal to 1. Clean technologies, instead, prevent externalities but impose an upfront cost equal to ω on the entrepreneur. This cost varies across agents, reflecting (negatively) exogenous differences in entrepreneurial ability. Assume for simplicity that ω is uniformly distributed between 0 and 1 over the population of agents.

Entrepreneurs must choose whether they want to operate in the official or unofficial sector. In the former case, they enjoy greater (gross) profits, equal to $\pi < 1$, but must comply with entry regulations. The cost of complying with entry regulations also depends, negatively, on entrepreneurial ability. Specifically, such cost equals ωR, where R is the amount of red tape required to set up a firm. Therefore, both the cost of preventing externalities and the cost imposed by the red tape are proportional to ω; the main difference between the two is that the former remains unobserved, while compliance with red tape is verifiable.

Alternatively, entrepreneurs may escape entry regulations by hiding in the shadow economy. If they do, however, they must restrict firm size in order not to attract the attention of regulators; in particular, operating profits and negative externalities generated by each unofficial firm are, respectively, $\theta\pi$ and θ, with $\theta < 1$. Its inverse θ^{-1} may be interpreted as a measure of enforcement; the higher it is, in fact, the smaller must be a firm in order not to be detected.[7]

The private utility of each agent is equal to

$$U = y - X, \tag{1}$$

where y is income and X is the total level of negative externalities present in the economy. Later on I will slightly modify the utility function in (1) to introduce the key ingredient of the model, namely heterogeneity in values and beliefs. Before doing that, let me clarify the role of entry regulations in the simple economy described so far, first under a benevolent social planner and then in the decentralized equilibrium.

3.1 First and second best optimal regulatory policy

The inequalities $\pi < 1$, $\theta < 1$ and $\omega < 1$ imply that the social optimum W^* is attained when (i) all entrepreneurs prevent externalities, (ii) all firms operate in the official economy,

[7] The *size dualism* is a well-established theoretical and empirical result in the literature on unofficial activity (see, for instance, Rauch, 1991; Fortin et al., 1997; Amaral and Quintin, 2006; Antunes and Cavalcanti, 2007).

and (iii) all and only the agents for which $\omega < \bar{\omega}^* = \pi/(1+R) < 1$ set up a firm (notice that $\bar{\omega}^*$ also equals the measure of entrepreneurs active in the market). The resulting social welfare function,

$$W^*(R) = \bar{\omega}^*\pi - (1+R)\int_0^{\bar{\omega}^*} \omega d\omega = \frac{\pi^2}{2(1+R)},$$

is monotonically *decreasing* in R, which implies that the first best regulatory policy is $R^* = 0$.

With no benevolent social planner, agents do not internalize negative externalities, because they take aggregate output and total externalities as given. Therefore, entrepreneurial activity always entails (net) social costs in the decentralized economy. Such costs are greater when firms operate in the official sector because their size is bigger, i.e. $\pi - 1 < \theta(\pi - 1) < 0$. Therefore, the optimal policy is to set regulatory barriers so high as to drive all entrepreneurs into the unofficial sector.

Formally, agents enter the official sector if and only if $\pi - \omega R > \theta\pi$, or $\omega < \bar{\omega} = \pi(1-\theta)/R$, otherwise they hide in the shadow economy. Aggregate welfare equals

$$\widetilde{W}(R) = -[\bar{\omega} + (1-\bar{\omega})\theta](1-\pi) - R\int_0^{\bar{\omega}} \omega d\omega < 0,$$

which is an *increasing* function of R; therefore, the second-best regulatory policy is $\tilde{R} \to +\infty$ (i.e $\lim_{R\to+\infty} \widetilde{W} = 0$).

Thus, the optimal regulatory policy changes dramatically when moving from the social planner solution to the decentralized economy equilibrium. In the former, entry regulations represent simply a deadweight cost; in the latter, they provide a second best solution to market failures. Notice that this policy would also be the one preferred by all agents under the veil of ignorance, i.e. it would be the majority voting equilibrium as far as agents vote before learning their ability.

In the remainder of this section I allow for a richer characterization of individual values, assuming that some agents voluntarily abstain from exerting negative externalities on the rest of the economy. Under this new assumption, the second best regulatory policy will be an interior of the set of feasible policies and will depend (negatively) on the incidence of the new type of agents. I will also investigate the interplay between values, trust, regulatory policies and the equilibrium level of externalities and unofficial activity, both within and across different economies.

3.2 Trust, trustworthiness and regulations

In this section I introduce agent heterogeneity in individual values and beliefs. Starting with the former, a fraction τ of agents are *trustworthy*, while the remaining part are not. The utility of the latter is the same as in (1), while that of trustworthy agents suffers psy-

chological penalties for emitting negative externalities or hiding in the shadow economy.[8] In particular, assume that these penalties are so high that trustworthy entrepreneurs always operate in the official sector and invest to prevent externalities.

Turning to beliefs, agents do not know the exact proportion of trustworthy individuals in the economy, but hold expectations about this proportion, denoted by $\hat{\tau}$. Such expectations reflect both the true (unobserved) τ and idiosyncratic prediction errors, so that $\hat{\tau}$ is independently distributed across agents according to the cumulative density function $\Phi(\hat{\tau};\tau)$. In particular, it seems natural to assume (and even impose) that

$$\tau' > \tau \Rightarrow \Phi(\hat{\tau};\tau') < \Phi(\hat{\tau};\tau),\ \forall\hat{\tau}. \tag{2}$$

Equation (2) simply states that idiosyncratic errors are not *systematically* biased, in that a higher fraction τ of trustworthy individuals raises on average expectations $\hat{\tau}$. By the law of large numbers, the expected fraction of trustworthy agents in the economy is also the subjective probability that each other individual is trustworthy, so that $\hat{\tau}$ may be also interpreted as *trust towards others*.

3.2.1 Individual preferences for regulation

According to the assumptions above, trustworthy agents only enter the official sector and, whenever they do, they invest to prevent negative externalities. Therefore, the only choice they face is whether to become entrepreneurs or not, which they do if and only if $\omega \leq \bar{\omega}_t = \pi/(1+R)$.

Untrustworthy agents, instead, never invest in clean technology and must decide whether to enter the official sector or hide in the shadow economy; they will choose the former if and only if $\omega \leq \bar{\omega}_u = \pi(1-\theta)/R$.[9]

Since trustworthy agents behave in line with social welfare maximization (the social planner case), while the untrustworthy act non-cooperatively, the social welfare function is now a weighted average of W^* and $\widetilde{W}$, with weights equal to the relative size of the two groups in the population (τ and $1-\tau$, respectively). Not surprisingly, the optimal regulatory policy is $R_\tau = \arg\max(W_\tau)$, or

$$r_\tau = \left(\frac{1-\tau}{\tau}\right)\phi,$$

with $r_\tau = \left(\frac{R_\tau}{1+R_\tau}\right)^2$ and $\phi = \left(\frac{2-\pi}{2\pi}\right)(1-\theta)^2$. Notice that R_τ is an interior solution between R^* and $\tilde{R}$, and it approaches one extreme or the other depending on τ: the higher the fraction of trustworthy agents, the closer the market equilibrium is to the first best outcome and the lower the need for public intervention, i.e. R_τ approaches $R^* = 0$; at the opposite

[8] This way of modeling trustworthiness is adopted, for instance, by Frank (1987) and Kandel and Lazear (1992).

[9] In principle, the untrustworthy could also decide not to enter at all, but this choice is always dominated by that of hiding in the shadow economy as $\theta\pi > 0$

end, the lower the fraction of trustworthy agents, the farther away the market equilibrium is from the first best outcome and the greater the need for public intervention, i.e. R_τ approaches $\tilde{R} \to +\infty$. Therefore, the higher the extent of market failures in the first place, the higher the optimal level of entry regulations. Individual demand for regulation depends in a similar way on expected trustworthiness. Therefore, it differs from R_τ (and from one agent to another) because of heterogeneity in $\hat{\tau}$.[10]

The expected utility of trustworthy agents, conditional on trust, is thus

$$U_t(\hat{\tau}) = \bar{\omega}_t \pi - (1+R)\int_0^{\bar{\omega}_t} \omega d\omega - (1-\hat{\tau})[\bar{\omega}_u + (1-\bar{\omega}_u)\theta],$$

which is maximized for

$$r_t(\hat{\tau}) = 2(1-\theta)^2/\pi(1-\hat{\tau}). \tag{3}$$

According to this condition, the preferred level of entry barriers depends, negatively, on trust towards others. Moreover, the effect of trust is stronger the greater is the cost of negative externalities relative to the benefits of economic activity, $1/\pi$, and the better is the quality of institutions, i.e. the lower is θ.

Turning to the untrustworthy agents, their expected utility is

$$U_u(\hat{\tau}) = [\bar{\omega}_u + (1-\bar{\omega}_u)\theta][\pi - (1-\hat{\tau})] - R\int_0^{\bar{\omega}_u} \omega d\omega,$$

which is increasing (decreasing) in R if and only if $\hat{\tau} < 1 - \pi/2$ ($\hat{\tau} > 1 - \pi/2$), so that the preferred level of regulations is one of the two corners of the set of feasible policies:

$$r_u = \begin{cases} 0 \Leftrightarrow \hat{\tau} > 1 - \pi/2 \\ \infty \Leftrightarrow \hat{\tau} < 1 - \pi/2 \end{cases} \tag{4}$$

Therefore, the level of red tape preferred by each untrustworthy agent is also inversely related to individual trust.

The first implication of the model is therefore that, at the individual level, preferences for regulation depend negatively on trust towards others. Next, I turn to examine the implications of this result for the cross country-pattern of trust, regulations and market failures.

3.2.2 Trust, regulations and market failures across countries

There are several economies, $j = 1, 2, ..., J$, like the one just described. Within each economy, regulatory policy is chosen by majority voting. Individuals vote behind the veil of ignorance about their own ability, even though they know the distribution of ω over the

[10] It would also differ because of heterogeneity in entrepreneurial ability. However, in order to focus on the role of cultural traits, let me introduce a veil of ignorance about ω, so that each agent knows only its distribution over the population (but not his/her own ability).

whole population.[11] Voting entails some effort so that only trustworthy individuals vote; by contrast, the untrustworthy take electoral results as given. While somewhat ad hoc, this assumption is consistent with other work relating electoral participation to civicness (see, for instance, Guiso et al., 2004). Under this last set of assumptions, the regulatory policy voted in country j is

$$r^j = 2(1-\theta^j)^2/\pi^j(1-\hat{\tau}_m^j), \tag{5}$$

where $\hat{\tau}_m^j$ denotes the median level of trust.

Equations (2) and (5) taken together deliver two additional implications of the model. First, the negative relationship between regulations and trust carries over across countries. Second, regulatory policy ultimately depends, negatively, on trustworthiness. By the implicit function theorem, in fact, the stochastic dominance assumption in (2) defines $\hat{\tau}_m$ as a positive function of τ,

$$\Phi(\hat{\tau}_m;\tau) = 1/2 \;\Rightarrow d\hat{\tau}_m/\tau > 0. \tag{6}$$

Finally, the equilibrium level of unofficial activity (as measured by total profits of firms operating in the informal sector) and externalities in each country depends on regulations and also, negatively, on trustworthiness

$$S^j = (1-\tau^j)(1-\bar{\omega}_u^j)\theta^j\pi^j = (1-\tau^j)[1-\pi^j(1-\theta^j)/R^j]\theta^j\pi^j, \tag{7}$$

$$X^j = (1-\tau^j)[\bar{\omega}_u^j + (1-\bar{\omega}_u^j)\theta^j] = (1-\tau^j)[\theta^j + \pi^j(1-\theta^j)^2/R^j]. \tag{8}$$

Therefore, the common dependence on trustworthiness affects the observed relationship with regulation. For the case of unofficial activity, it steepens the positive univariate regression line; for the case of externalities, it flattens the negative relationship and it may also turn it into a positive one. Section 5 will provide some evidence to quantify this bias; before doing that, I empirically examine the predictions of the model for the individual-level demand for regulation.

4 Individual-level evidence

The simple model in the previous section implies that, at the individual level, preferences for regulation depend negatively on trust.

4.1 Estimating equation

The WVS provides a measure of preferences for regulation. Question E042 in section *Politics and Society* of WVS asks each individual whether "The state should give more freedom to firms" or rather "The state should control firms more effectively". It thus

[11] You can think of this as a two-period economy: in the first period individuals vote over regulatory policies; in the second period they learn their ability and decide whether they want to set up a firm or not.

measures the individual *excess* demand for regulations (relative to the level that is actually observed in the country). The answer to this question takes on discrete values between 1 and 10, with higher values corresponding to higher demand for government intervention, and it was included in the survey sent to 32 European countries participating in the fourth wave of the survey (1999-2004), listed in Table 1. This measure will serve as the dependent variable of the estimating equation; let it be denoted by y.

In the model above, the individual demand for regulation is always inversely related to trust; however, the exact form of this relationship depends on the agent's trustworthiness, according to conditions (3) and (4). For simplicity, my estimating equation will be based on the sole preferences of the trustworthy, which depend continuously on trust. In particular, the excess demand by each individual in country j can be obtained by subtracting equation (5) from (3),

$$\underbrace{r - r^j}_{y^*} = \underbrace{2\hat{\tau}_m^j(1-\theta^j)^2/\pi^j}_{\alpha^j} - \underbrace{2(1-\theta^j)^2/\pi^j}_{\beta^j}\hat{\tau}. \tag{9}$$

One complication arises from the fact that y^* is a continuous variable, while its empirical counterpart y is a discrete index between 1 and 10. Following a standard approach, let y^* be the (unobserved) latent preferences driving the choice of each i-th individual among the k's possible values of y. In particular,

$$y_i = k \;\Leftrightarrow\; \gamma_{k-1} \leq y_i^* + \epsilon_i \leq \gamma_k \;\; k = 1, 2, ..., 10$$

where ϵ is an error term and the γs are unknown thresholds to be estimated. The odds ratio of individual i preferring a higher level of regulation, i.e. $y_i > k$, is

$$\Delta_i(y_i > k) = \frac{Prob(y_i > k)}{Prob(y_i \leq k)} = \frac{1 - \Lambda(\gamma_k - y_i^*)}{\Lambda(\gamma_k - y_i^*)} \;\forall k,$$

where Λ is the c.d.f. of ϵ. Assuming that Λ is logistic and plugging $trust_i$ for $\hat{\tau}$ into equation (9) delivers

$$\ln \Delta_i(y_i > k) = -\gamma_k + \alpha^j - \beta^j trust_i. \tag{10}$$

The linear log-odds ratio in (10) characterizes the ordered logit model, which can be estimated by Maximum Likelihood.

The main advantage of the logit model (relative, for instance, to the ordered probit) is that it provides an easy interpretation of the coefficients. In particular, the exponentiated coefficient equals the ratio of the odds of $y > k$ over the same odds when the explanatory variable is lower by one unit. This is a particularly useful property given that *trust* is a binary variable, so that

$$e^{-\beta} = \frac{\Delta_i(y_i > k | trust_i = 1)}{\Delta_i(y_i > k | trust_i = 0)}$$

i.e. the exponentiated coefficient of trust is simply the ratio between the odds of preferring more regulation of a trustful individual over the same odds of a non-trustful individual.

The term α^j in (10) will be absorbed by country-specific fixed effects, thus reducing the

scope for omitted variable bias and reverse causality due to differences in country-specific factors, such as the severity of market failures and the quality of regulation.[12]

The right-hand side of equation (10) will also control extensively for individual characteristics such as age, gender, income, education, occupation, etc., which are included in the WVS data. Table 1 reports the sample size for each country included in the survey, along with the total population, which makes apparent the unbalanced coverage of WVS across countries (coverage is relatively lower for larger countries). I thus weighted observations according to the product of national sampling weights (provided by the WVS) and country populations. However, all results presented below are unaffected when using unweighted observations.

4.2 Results

Tables 2 to 5 present the results of individual-level estimates. Both the simple and exponentiated coefficients (i.e. the odds ratios) are reported. The first column in Table 2 presents the results of the univariate regression pooling all individuals. The coefficient of *trust* is negative and very high in absolute value. Removing cross-country heterogeneity (column 2) halves the value of the coefficient, which however remains strongly statistically significant. According to this estimate, the odds of $y > k$ for a trustful individual are about 15 percent lower than the same odds for a non-trustful individual. Due to the inclusion of country-specific intercepts, this difference may be interpreted as the excess demand for regulations by trustful individuals relative non-trustful ones, keeping constant the level and quality of actual regulation (as well as any other country-specific factor).

The remaining columns of the table control for some individual characteristics: age, gender, income and schooling. These variables will be also included in all subsequent tables. The main result is that those groups that are traditionally disadvantaged in economic markets (by gender, income and education) prefer higher levels of regulation. In one of the next tables I will also allow the slope coefficient to differ across these groups.

Before doing that, Table 3 investigates the robustness of the results to an additional set of control variables that are probably correlated with both trust and preferences for regulation. Column (1) starts with the labor market condition. It turns out that those unemployed are on average more in favor of regulation. The next column distinguishes between (potential) insiders and non-insiders of regulations. In line with the descriptive evidence in Figure 1, bureaucrats and politicians do *not* seem to be more attached to regulations relative to other agents, while entrepreneurs and other self-employed individuals are bitterly against them. In column (3) I include measures of trust towards those groups

[12] One complication with this approach is that fixed effects are unattractive in non-linear models. The problem is that the estimator of each of these "incidental" parameters uses only information from the corresponding group so that, when the size of each group is limited and small, the variance of the estimator (both of the intercepts and the slope) does not asymptotically converge to 0 (see, for instance, Greene, 2004). This is usually the case for panels of N cross-sectional units observed over T periods. However, in this case I have thousands of (individual) observations available to estimate each (country) fixed effect, so that the relevant asymptotics allow for consistent estimation.

in charge of dictating and enforcing regulations, namely politicians and civil servants. I also include trust towards the judicial system, which may potentially substitute regulation in addressing some types of market failure (reconducible, for instance, to moral hazard and asymmetric information). None of these variables, however, subtracts explanatory power from *trust*; indeed, they are not even significant in the regression, suggesting that the coefficient of main interest is not capturing the effect of other cultural traits possibly correlated with trust. This is also true when controlling for political ideology, even though in this case the coefficient of *partisan* is strongly statistically significant and it has the expected sign (individuals leaning toward to right preferring less government intervention). The next column distinguishes individuals according to whether they profess a hierarchical religion or not. After controlling for individual *trust*, hierarchical religion does not seem to affect directly the demand for regulation. In the next section I will rely on this finding to exploit religion as a source of exogenous variation in individual trust across countries. Overall, the coefficient of *trust* remains strongly statistically significant and extremely stable throughout all columns of Table 3; this conclusion holds true also in the last column, which includes all control variables in the same specification.

Table 4 shows how the slope (other than the intercept) of the regression changes with individual and country characteristics. The first two columns distinguish between non-insiders and insiders. It turns out that trust affects only the demand for regulation by the former group. The preferences of the insiders, indeed, could respond more to the private interests emphasized by the public choice literature. The next two columns distinguish individuals according to their educational attainment, the demand by less educated individuals being more responsive to trust. Actually, this segment of the population may be more vulnerable to some types of market failure (like, for instance, asymmetric information), so that the mechanism proposed in this paper may be more relevant for this category. Finally, the effect of trust does not significantly differ by individual income, age and gender.[13]

The last four columns start distinguishing the effect of trust according to country (rather than individual) characteristics. Intuitively, the effect of trust should be stronger in countries in which the costs of market externalities are higher relative to the benefits of economic activity. This is captured in the model by the term π^{-1} in equation (3), which increases (in absolute value) the slope of *trust*. Even though an exact empirical counterpart for this parameter is not easily available, Djankov et al. (2002) suggest that "Market failures are likely to be both more pervasive and severe in poor countries than in rich ones". This may be due for instance, to the fact that less developed countries have backward and more polluting technologies. Therefore, in columns (5) and (6) I compare the effect of trust separately in Eastern and Western European countries. In line with the discussion above, the effect is stronger in the former group of countries; in particular, the ratio between the odds of demanding more regulation for an untrustful individual over those of a trustful one is twice as much in Eastern as in Western countries.

[13]These results are not reported but are available upon request

On the other hand, the quality of government intervention may also be worse in less developed countries (for instance, because of more widespread corruption), which in turn would discourage (untrustful) individuals from demanding more regulation. This last effect is captured in the model by the term θ in equation (3), a higher θ (indicating a lower quality of institutions) decreasing the coefficient of trust. To disentangle the effect of economic development from that of institutional quality, the last two columns of the table present separate regressions for Eastern and Western Germany, respectively. Even a decade after reunification the two areas had very different levels of economic development; on the other hand, they shared the same formal institutions, which in turn allows to distinguish between the effect of economic and institutional factors. As expected, keeping institutional quality constant further increases the differential effect of trust in less developed regions.

The difference-in-difference specification in Table 5 takes a more systematic approach by interacting individual trust with country characteristics possibly correlated with the risk and the severity of market failure and with the effectiveness and efficiency of regulatory responses. The first of these measures is the (log of) real GDP per capita in year 2000 (at constant 2005 PPP international dollars), which proxies for the level of economic development. Institutional characteristics are measured by indexes of corruption, regulatory quality and government effectiveness provided by the last release of the World Bank Governance Indicators (Kaufmann et al., 2008). All indexes are increasing in institutional quality and they have been rescaled to have zero mean and standard deviation equal to 1 (the same is true also for the index of economic development), so that the odds ratio of the interaction term may be read as the ratio between the odds of preferring more regulation for a trustful individual that lives in a country with a (one standard deviation) higher level of economic and/or institutional development, and the same odds for a trustful individual living in the average country.

The interaction of individual trust with economic development (column 1) is only weakly statistically significant, and the interactions with each of the institutional variables are not significant. This is due to the fact that the three institutional indexes are positively and strongly correlated with the level of economic development, as shown in Figure 3; at the same time, economic development and institutional quality affect the slope coefficient of trust in opposite directions.

In fact, interacting both economic and institutional factors with trust in the same specification raises both the magnitude and the statistical significance of their effects (columns 5 to 8). In particular, the effect of trust seems stronger in less developed countries and in countries with relatively less corrupt public officials, better regulatory quality and more efficient governments. Consistently with the previous comparison between Eastern and Western Europe, the effect of economic development dominates that of institutional quality, the coefficient of the former being twice as much that of the latter. This means that the greater risk and severity of market failure in less developed countries overcome the effect of the lower quality of government intervention in driving a higher demand for regulation by untrustful individuals in such countries.

5 Cross-country evidence

The results presented above suggest that, within each country, trust is a significant determinant of individual preferences for regulation. In this section I investigate whether this relationship carries over across countries and its implications for the cross-country pattern of regulations, externalities and the size of unofficial activity.

5.1 Culture and regulation

At the aggregate, cross-country level, the first prediction of the model is that regulations depend negatively on (median) trust. The empirical counterpart of condition (5) is

$$R = a - b\hat{\tau}_m + \upsilon, \tag{11}$$

where b is the coefficient to be estimated and υ is an error term. The cross-country measures of regulation and trust were already introduced in Section 2; they are the log number of entry procedures from Djankov et al. (2002) and the average level of trust (as measured by the WVS). The results of OLS estimates on equation (11) are presented in Table 7.

The first column shows the univariate regression of regulation on trust. A one percentage point increase in trust is associated on average with a 2 percent reduction in the number of procedures, this effect being very precisely estimated. Controlling for the level of economic development, as proxied by the log of GDP per capita in 1999, weakens only slightly the effect of trust (column 2).[14] In column 3 I add the log of total population in the same year and a dummy variable equal to 1 for countries of British legal origin. The inclusion of these variables in the specification is motivated by the fact that the creation of new institutions entails significant fixed costs and is therefore limited by the size of the market and the level of transaction costs (Demsetz, 1967). Mulligan and Shleifer (2005) provide evidence consistent with this theory for the specific case of regulatory institutions using population to measure the size of the market and British legal origin as a proxy for (higher) transaction costs.[15] In my sample too, regulations increase with population and are less pervasive in countries of British legal origin. Most importantly, both variables provide sources of exogenous variation in regulation, which will prove extremely useful to investigate the effects of regulation across countries.[16]

[14] The data for all control variables also come from Djankov et al. (2002).

[15] Their argument is that, historically, the cost of incremental regulations was lower in France than in England thanks to the pervasive administrative State introduced after the Revolution. As legal and regulatory frameworks have spread through conquest and colonization, so have the cost structures of incremental regulations.

[16] Including on the right-hand side measures of education, democracy and ethno-linguistic fractionalization does not significantly affect the results, in line with the findings of Aghion et al. (2009).

5.2 Instrumental variable estimates

In principle, one can not rule out reverse causality. For instance, burdensome regulation could affect average honesty by increasing the incentives for predatory practices and corruption, which would in turn impact (negatively) on average trust because of equation (6). Culture could in fact respond endogenously to incentives because of evolutionary forces (Hirshleifer, 1984; Frank, 1987), rational choice (Benabou and Tirole, 2006) and intergenerational transmission of moral values (Bisin et al., 2004; Tabellini, 2009). For this reason, in the last two columns $TRUST$ is instrumented by the share of population professing either Catholic or Muslim religion, as reported by McCleary and Barro (2006). Seminal work by Putnam (1993) and La Porta et al. (1997) suggests in fact that hierarchical religions, namely Catholic and Muslim, are associated with lower trust towards others compared, for instance, with Protestantism; the individual-level evidence presented in Guiso et al. (2003) is broadly consistent with this picture. Since (i) country religions are inherited from the ancient past and (ii) individual level estimates presented in the previous section exclude that religion affects directly the demand for regulation (after controlling for trust), I can use religion as a source of exogenous variation in trust, analogously to La Porta et al. (1997).

The results of first stage estimates confirm that, in my sample too, a higher fraction of the population professing a hierarchical religion brings a lower level of trust (column 4). The average effect is identical across different hierarchical religions (namely Catholic and Muslim), so that I group them into a single variable in column (5).

Second stage estimates show that the coefficient of trust remains negative and statistically significant. Actually, the TSLS coefficient is greater in absolute value than the OLS one, which means that, if anything, the feedback effect from regulation to trust would be positive. According to these estimates, a standard deviation increase in the percentage of trustful individuals within the population (equal to 15.3 percent) cuts the red tape by about 20 percent.

5.3 The effects of regulation

Turning to examine the effects of regulation, the theoretical model predicts that heavier regulation and lower trustworthiness increase the size of the shadow economy across countries. The empirical counterpart of equation (7) is

$$S = \alpha - \delta\tau + \mu R + \nu, \tag{12}$$

where δ and μ are positive coefficients to be estimated and ν is an error term independently distributed from υ. Excluding τ from the specification introduces an (asymptotic) bias in the OLS estimated coefficient $\hat{\mu}$ equal to $plim(\hat{\mu} - \mu) = -\delta Cov(R, \tau)/Var(R)$. After plugging equation (11) for R, the resulting bias is proportional to the covariance between

average trust and trustworthiness

$$BIAS = \delta \cdot \frac{b \cdot Cov(\hat{\tau}_m, \tau)}{Var(R)}. \tag{13}$$

Unfortunately, it is not possible to explicitly control for τ in equation (13) because, as discussed in Section 2, reliable measures of trustworthiness are not easily available across countries. However, notice that the bias is different from 0 only insofar as the covariance between trust and trustworthiness is greater than 0; but whenever the latter is true, average trust provides a proxy for average trustworthiness. In particular, the greater this covariance, the greater the bias and the better the extent to which trust approximates trustworthiness. As discussed before, there are several theoretical arguments and extensive empirical evidence suggesting that trust and trustworthiness are intimately related.

Table 8 presents the estimates of equation (12). The first column replicates the regression in Table IV of Djankov et al. (2002). The dependent variable is the size of the unofficial sector (as a percentage of GDP) and the explanatory variable is the measure of entry regulations. According to this univariate regression, one standard deviation increase in entry regulations increases the size of the shadow economy by half a standard deviation, the estimated coefficient being very statistically significant. However, after controlling for $TRUST$, the effect of regulations is not significantly different from 0 (column 2). These estimates suggest that the effect of regulations was capturing omitted variation in cultural traits, as proxied by average trust. The relative magnitude of the effect of regulation in column 1 and of trust in column 2 is also identical: one standard deviation increase in the explanatory variable implies about half a standard deviation decrease in the size of the shadow economy. One may wonder whether the difference between the results in column (1) and (2) lies in the sample, due to the fact that data on trust are missing for almost one third of the countries. However, this is not the case; re-estimating the univariate regression in column (1) on the reduced sample available in column (2) leads to a point estimate of 9.76, statistically significant at the 99 percent confidence level (standard error 1.60).

Djankov et al. (2002) also present one further specification in which they include on the right-hand side the level of country development, as measured by the log of GDP per capita, arguing that this variable controls for the risk and severity of market failure. In column (3) I replicate this specification, thus dropping average trust. Once I do that, the coefficient of regulation is again strongly statistically significant (even though smaller in magnitude than the univariate regression in column 1). When I plug back average trust into the equation (column 4), its coefficient is not statistically significant at the conventional 10 percent confidence level. Still, keeping average trust constant across countries is important for correctly evaluating the effects of regulation; in fact, the coefficient of $ENTRY$ drops from 5.3 to zero when moving from column (3) to column (4).

Finally, in the last two columns of the table I examine the causal impact of both regulations and culture taking a TSLS approach. In particular, I use population and

legal origin as instruments for regulation. According to the results in Table 7 and to those presented in Mulligan and Shleifer (2005), both factors are significant determinants of the sphere of government activity. In addition, after controlling for regulation, the size of the country and the type of legal origin are most likely exogenous (and certainly predetermined) to the level of informal activities observed in the 1990s. As for trust, I adopt the same approach as in the previous table, using the cross-country diffusion of hierarchical religions as a source of exogenous variation in average trust. First stage estimates, reported in the bottom panels of Table 8, confirm that the three instruments fit well the actual variation in both regulation and trust across countries. Moreover, the Hansen J over-identifying restrictions test can not reject the null hypothesis that they affect the size of unofficial activity only through variation in regulation and average trust. Turning to second stage estimates, the TSLS coefficient of $ENTRY$ is much lower than the OLS one and it is not statistically significant, regardless of whether GDP is included or not in the regression. By contrast, average trust has a negative causal effect on unofficial activity and, even though the two-stage approach makes the estimate somewhat more noisy, its coefficient remains statistically significant at the conventional confidence level.

Table 9 estimates the effect of regulations on another outcome considered by Djankov et al. (2002), namely the level of water pollution, which is a proxy for the negative externalities in the economy. In this case too, Djankov et al. (2002) estimate a positive coefficient on entry regulations, and they interpret this as evidence against public interest theories of regulation. Once again, however, this result disappears after controlling for the effect of culture; actually, the coefficient becomes negative and strongly statistically significant, this result being confirmed also in TSLS regressions.

6 Conclusion

Regulation is often blamed for being both ineffective and inefficient; however, people seem reluctant to abandon it. This paper offers a view that may potentially reconcile these two facts. The main insight is that, far from being exogenously determined, the actual level of regulation is an equilibrium outcome. In particular, stringent regulations may be enacted (at least in part) in response to market failure originating in (lack of) attitudes for cooperation. These attitudes may drive part of the correlation existing between the level of regulation and several economic outcomes, confounding inference about causality.

I addressed these issues by explicitly controlling for such omitted factors. Actually, controlling for trust leads to reconsider the effect of regulation on the size of the unofficial economy and the level of negative externalities. Of course, these results do not exclude the possibility that regulation may be a very inefficient solution to market failure. They suggest, however, that in order to make liberalization and deregulation politically appealing it might be necessary to foster and improve alternative institutions such as private litigation and class action.

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Appendix

Individual-level variables:

Dependent variable: answer to the question "How would you place your views on this scale? 1 means you agree completely with the statement 'The state should give more freedom to firms'; 10 means you agree completely with the statement 'The state should control'; and if your views fall somewhere in between, you can choose any number in between." Source: WVS, variable E042.

Trust: answer to the question "Generally speaking, would you say that most people can be trusted?". The variable takes value 1 if the individual answered "Most people can be trusted", and 0 if the individual answered "Can't be too careful in dealing with people". Source: WVS, variable A165.

High/low income: binary variables indicating the top and bottom category of a three-value index recoding household income on a country basis. Source: WVS, variable X047R.

High/low schooling: binary variables indicating the top and bottom category of a three-value index recoding individual education on a country basis. Source: WVS, variable X025R.

Unemployment: binary variable indicating whether the individual is unemployed. Source: WVS, variable X028.

Self employment: binary variable indicating whether the individual is self-employed. Source: WVS, variable X028.

Manager: binary variable indicating whether the individual is a manager. Source: WVS, variable X035 (2-digit profession classification).

Burpol: binary variable indicating whether the individual is a politician and/or a high-ranking public official. Source: WVS, variable X035 (2-digit profession classification).

Trust parliament, civil servants, justice: binary variables indicating whether the individual trusts each institution. Source: WVS, variables E075, E076, E085.

Partisan: 10-category index of individual political ideology, where 1 is extreme left and 10 is extreme right. Source: WVS, variable E033.

Hierarchical: binary variable equal to 1 if the individual belongs to either the Catholic or Muslim religion. Source WVS, variable F025.

Cross-country variables:

ENTRY: the number of different procedures that a start-up has to comply with in order to obtain legal status. Source: Djankov et al. (2002)

TRUST: percentage of respondents who answer that "Most people can be trusted" to the question "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?". Source: WVS (II and III waves), variable A165.

Unofficial activity: size of the informal economy as a percentage of GDP. Source: Djankov et al. (2002).

Water pollution: emissions of organic water pollutants (kilograms per day per worker) in 1998. Source: Djankov et al. (2002).

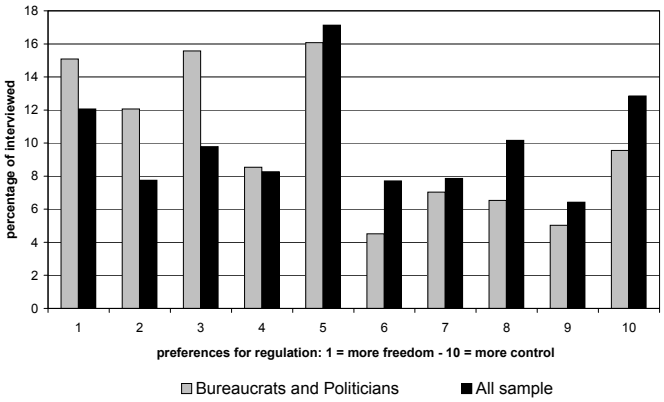
$\ln GDP$: log of gross domestic product per capita in current US dollars in 1999. Source: Djankov et al. (2002)

$\ln POP$: log of total country population in 1999. Source: Djankov et al. (2002)

$UK\ LEGAL$: binary variable indicating British legal origin. Source: Djankov et al. (2002)

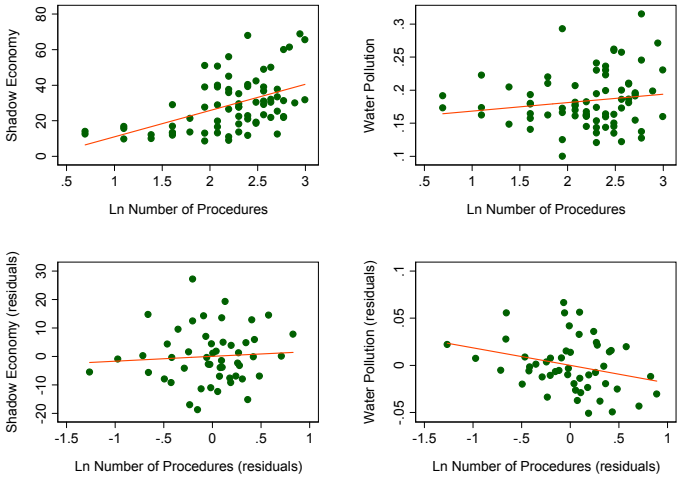
HIER: percentage of people in the country professing either the Catholic or Muslim religion. Source: McCleary and Barro (2006).

Figure 1: Opinions about regulation



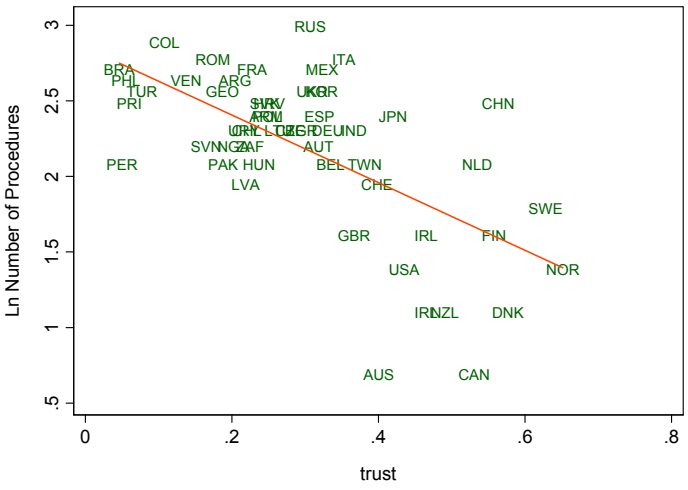
The histogram shows the distribution of answers to question E042 of the World Values Survey in 32 countries, distinguishing between two categories of individuals: bureaucrats and politicians versus other individuals. Answers take on discrete values between 1 and 10, where 1 means "State should give more freedom to firms" and 10 means "State should control firms more effectively".

Figure 2: Regulations and market failures



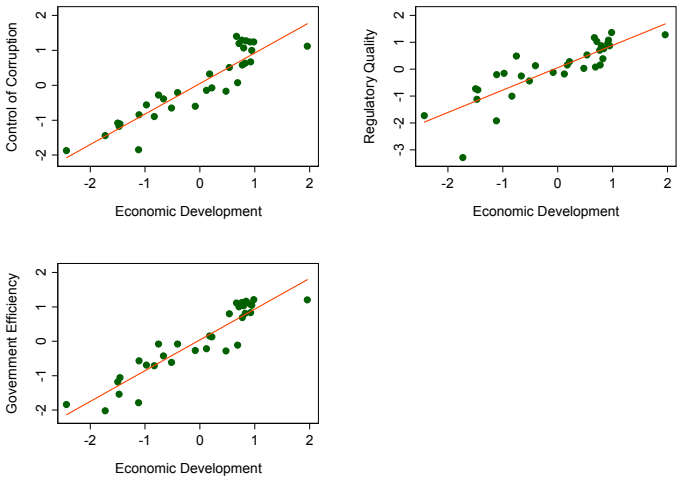
These graphs show the cross-country correlation between entry regulations and some types of market failure. The measure of entry regulations is the (log) number of procedures required to open a business; Shadow Economy is the (estimated) size of the informal sector; Water Pollution is emissions of organic water pollutant (kilograms per day per worker). All three measures come from Djankov et al. (2002). The two graphs on the bottom show the relationship between the residuals of a regression of each variable on average trust. Average country trust is the fraction of people interviewed by the World Values Survey in each country that declared that "most people can be trusted".

Figure 3: Trust and regulation



This graph shows the cross-country relationship between trust and entry regulation. Average country trust is the fraction of people interviewed by the World Values Survey in each country that declared that "Most people can be trusted". The measure of entry regulations is the (log) number of procedures required to open a business, from Djankov et al. (2002).

Figure 4: Economic development and the quality of regulations



This graph shows the cross country correlation between several measures of institutional quality. The index of economic development is the standardized logarithm of real GDP per capita in year 2000 (at constant 2005 PPP International Dollars). The indexes of Control of Corruption, Regulatory Quality and Government Efficiency are from Kaufmann et al. (2008).

Table 1: Sample

country	code	sample	obs.	population
Austria	AUT	1523	1366	8,011,560
Belgium	BEL	1914	1769	10,252,000
Bulgaria	BGR	1002	875	8,060,000
Belarus	BLR	1002	832	10,005,000
Czech Republic	CZE	1911	1823	10,273,300
Germany	DEU	2045	1838	82,210,000
Denmark	DNK	1025	905	5,337,344
Spain	ESP	2417	1002	40,263,199
Estonia	EST	1007	893	1,369,512
Finland	FIN	1040	942	5,176,196
France	FRA	1617	1519	58,895,516
Great Britain	GBR	2005	1717	59,742,980
Greece	GRC	1142	948	10,917,500
Croatia	HRV	1004	940	4,502,500
Hungary	HUN	1003	910	10,210,971
Ireland	IRL	1014	923	3,805,399
Iceland	ISL	970	900	281,000
Italy	ITA	2002	1845	56,948,602
Lithuania	LTU	1020	884	3,499,527
Luxemburg	LUX	1211	1038	438,000
Latvia	LVA	1015	942	2,372,000
Malta	MLT	1004	980	390,000
Netherlands	NLD	1005	978	15,925,431
Polonia	POL	1098	1007	38,453,801
Portugal	PRT	1001	883	10,225,803
Romania	ROM	1148	1032	22,443,000
Russia	RUS	2504	2265	146,303,000
Slovak Republic	SVK	1334	1218	5,388,740
Slovenia	SVN	1008	926	1,989,000
Sweden	SWE	1018	948	8,869,000
Turkey	TUR	4609	1107	67,420,000
Ukraine	UKR	1196	1067	49,175,848
Total		45814	37222	759,155,750

Notes: This table lists all countries for which individual-level data were available. For each country, it reports the number of individuals interviewed by the fourth wave of WVS, the number of non-missing observations (i.e. the number of individuals that answered both questions about trust and regulation) and the total population.

Table 2: Individual-level estimates (baseline)

	(1) *pooled*	(2) *country FE*	(3) *demo*	(4) *income*	(5) *school*
trust	-.349***	-.165***	-.154***	-.157***	-.130***
	[0.705]	[0.848]	[0.857]	[0.855]	[0.878]
	(.028)	(.046)	(.046)	(.047)	(.045)
$age/100$			.876	1.831**	1.911**
			[2.400]	[6.240]	[6.759]
			(.608)	(.811)	(.826)
$(age/100)^2$			-.024	-1.141	-1.338
			[0.977]	[0.319]	[0.262]
			(.678)	(.993)	(.982)
$female$			.188***	.187***	.189***
			[1.206]	[1.205]	[1.208]
			(.031)	(.034)	(.035)
high income				-.346***	-.297***
				[0.708]	[0.743]
				(.035)	(.034)
low income				.088	.059
				[1.092]	[1.061]
				(.060)	(.057)
high schooling					-.206***
					[0.814]
					(.050)
low schooling					.124***
					[1.132]
					(.045)
obs.	37222	37222	37078	31663	31489
country FE	NO	YES	YES	YES	YES
countries		32	32	32	32
log-L	-83648	-82317	-81830	-69661	-69216
log-L_0	-83802	-83802	-83487	-71310	-70913
pseudo R^2	.002	.018	.02	.023	.024

Notes: This table presents estimates of the effect of trust on preferences for regulation at the individual level. The dependent variable is the answer to question E042 in the WVS. It takes on discrete values from 1 to 10, where 1 means "State should give more freedom to firms" and 10 means "State should control firms more effectively". The explanatory variable *trust* is the answer to question A165 in the WVS.: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". It takes value 1 if the answer was "Most people can be trusted" and 0 otherwise. All other variables are described in the Appendix. The estimation method is the Maximum Likelihood ordered logit model. The log-likelihood at the last and first iteration are shown at the bottom of each column: the pseudo R^2 equals 1 minus the ratio between the two. Odds ratios are presented in square brackets. Robust standard errors clustered by country are presented in parenthesis. Observations are weighted by the product of national sampling weights and country populations. *, ** and *** denote coefficients significantly different from zero at the 90% confidence, 95% confidence and 99% confidence, respectively.

Table 3: Individual-level estimates (robustness)

	(1) *unempl*	(2) *insiders*	(3) *trust*	(4) *partisan*	(5) *religion*	(6) *all*
trust	-.126***	-.141***	-.132***	-.124**	-.130***	-.139**
	[0.882]	[0.869]	[0.876]	[0.883]	[0.878]	[0.870]
	(.046)	(.046)	(.047)	(.051)	(.045)	(.057)
unemployed	.174*					.116
	[1.190]					[1.123]
	(.094)					(.305)
self employed		-.479***				-.453***
		[0.620]				[0.636]
		(.088)				(.124)
manager		-.295*				-.250
		[0.745]				[0.779]
		(.176)				(.181)
burpol		.278				.262
		[1.320]				[1.300]
		(.283)				(.266)
trust parliament			-.007			-.074
			[0.993]			[0.929]
			(.057)			(.067)
trust civil servants			-.002			.057**
			[0.998]			[1.059]
			(.033)			(.028)
trust justice			-.035			-.020
			[0.965]			[0.981]
			(.032)			(.038)
partisan				-.141***		-.172***
				[0.868]		[0.842]
				(.025)		(.018)
hierarchical					.004	.047
					[1.004]	[1.048]
					(.057)	(.042)
obs.	31357	22875	29107	25862	31489	17748
countries	32	30	32	32	32	30
log-L	-68924	-50282	-64057	-56648	-69216	-38811
log-L_0	-70616	-51534	-65602	-58409	-70913	-40101
pseudo R^2	.024	.024	.024	.03	.024	.032

Notes: This table presents estimates of the effect of trust on preferences for regulation at the individual level. The dependent variable is the answer to question E042 in the WVS. It takes on discrete values from 1 to 10, where 1 means "State should give more freedom to firms" and 10 means "State should control firms more effectively". The explanatory variable *trust* is the answer to question A165 in the WVS.: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". It takes value 1 if the answer was "Most people can be trusted" and 0 otherwise. All other variables are described in the Appendix. All regressions include also *age*, age^2, *female*, *high income*, *low income*, *high schooling*, *low schooling* and country fixed effects. The estimation method is the Maximum Likelihood ordered logit model. The log-likelihood at the last and first iteration are shown at the bottom of each column: the pseudo R^2 equals 1 minus the ratio between the two. Odds ratios are presented in square brackets. Robust standard errors clustered by country are presented in parenthesis. Observations are weighted by the product of national sampling weights and country populations. *, ** and *** denote coefficients significantly different from zero at the 90% confidence, 95% confidence and 99% confidence, respectively.

Table 4: Individual-level estimates (sample splits)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	INSIDERS		SCHOOLING		COUNTRIES		GERMANY	
	no	*yes*	*low*	*high*	*Eastern*	*Western*	*Eastern*	*Western*
trust	-.132***	-.063	-.228***	.009	-.231**	-.085***	-.450***	-.098
	[0.877]	[0.939]	[0.796]	[1.009]	[0.794]	[0.919]	[0.637]	[0.907]
	(.043)	(.100)	(.077)	(.065)	(.112)	(.027)	(.159)	(.145)
obs.	28370	3013	11122	6185	12046	19443	695	715
countries	32	32	32	32	11	21		
log-L	-62398	-6433	-24189	-13681	-26041	-42801	-1569	-1549
log-L_0	-63907	-6658	-24938	-13899	-26578	-43944	-1582	-1561
pseudo R^2	.024	.034	.03	.016	.02	.026	.008	.007

Notes: This table presents estimates of the effect of trust on preferences for regulation at the individual level. The dependent variable is the answer to question E042 in the WVS. It takes on discrete values from 1 to 10, where 1 means "State should give more freedom to firms" and 10 means "State should control firms more effectively". The explanatory variable *trust* is the answer to question A165 in the WVS.: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". It takes value 1 if the answer was "Most people can be trusted" and 0 otherwise. Different columns refer to different subsamples, indicated on top of each column. The category INSIDERS includes entrepreneurs, managers, bureaucrats and politicians; the categories for schooling refer to the binary variable classifications. All other variables are described in the Appendix. All regressions include also *age*, age^2, *female*, *high income*, *low income*, *high schooling*, *low schooling* and country fixed effects. The estimation method is the Maximum Likelihood ordered logit model. The log-likelihood at the last and first iteration are shown at the bottom of each column: the pseudo R^2 equals 1 minus the ratio between the two. Odds ratios are presented in square brackets. Robust standard errors clustered by country are presented in parenthesis. Observations are weighted by the product of national sampling weights and country populations. *, ** and *** denote coefficients significantly different from zero at the 90% confidence, 95% confidence and 99% confidence, respectively.

Table 5: Individual-country interactions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
trust	-.111**	-.115***	-.114***	-.114***	-.120***	-.135***	-.125***
	[0.895]	[0.892]	[0.892]	[0.892]	[0.887]	[0.874]	[0.883]
	(.046)	(.044)	(.038)	(.043)	(.030)	(.031)	(.028)
$trust \times ECONDEV$	.115*				.290***	.284***	.322***
	[1.122]				[1.337]	[1.329]	[1.379]
	(.060)				(.102)	(.094)	(.098)
$trust \times CORRCTR$		.067			-.170**		
		[1.069]			[0.843]		
		(.059)			(.073)		
$trust \times REGQUAL$			.052			-.173***	
			[1.054]			[0.842]	
			(.054)			(.064)	
$trust \times GOVEFF$				.065			-.203***
				[1.068]			[0.816]
				(.058)			(.072)
obs.	31489	31489	31489	31489	31489	31489	31489
countries	32	32	32	32	32	32	32
log-L	-69201	-69209	-69212	-69210	-69194	-69191	-69192
log-L_0	-70913	-70913	-70913	-70913	-70913	-70913	-70913
pseudo R^2	.024	.024	.024	.024	.024	.024	.024

Notes: This table presents estimates of the effect of trust on preferences for regulation at the individual level. The dependent variable is the answer to question E042 in the WVS. It takes on discrete values from 1 to 10, where 1 means "State should give more freedom to firms" and 10 means "State should control firms more effectively". The explanatory variable *trust* is the answer to question A165 in the WVS.: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". It takes value 1 if the answer was "Most people can be trusted" and 0 otherwise. The other variables are interactions of *trust* with country characteristics: $DEVEL$ is the level of development, as measured by the (log of) GDP per capita at constant 2005 international dollars; $CORRCTR$, $REGQUAL$ and $GOVEFF$ are the World Bank Governance Indicators for the control of corruption, the regulatory quality and the government effectiveness. All country variables are standardized to have mean 0 and standard deviation equal to 1. All regressions include also *age*, age^2, $female$, *high income*, *low income*, *high schooling*, *low schooling* and country fixed effects. The estimation method is the Maximum Likelihood ordered logit model. The log-likelihood at the last and first iteration are shown at the bottom of each column: the pseudo R^2 equals 1 minus the ratio between the two. Odds ratios are presented in square brackets. Robust standard errors clustered by country are presented in parenthesis. Observations are weighted by the product of national sampling weights and country populations. *, ** and *** denote coefficients significantly different from zero at the 90% confidence, 95% confidence and 99% confidence, respectively.

Table 6: Correlation matrix and summary statistics

	ENTRY	*TRUST*	*Unoff. Act.*	*Water. Poll.*	ln *GDP*	ln *POP*	*LEGOR UK*	*HIER*
Correlation matrix								
TRUST	-0.671							
Unoff. Act.	0.463	-0.648						
Water. Poll.	-0.097	-0.142	0.343					
ln *GDP*	-0.481	0.629	-0.779	-0.273				
ln *POP*	0.347	-0.233	0.166	-0.130	-0.257			
LEGOR UK	-0.614	0.250	-0.184	0.069	-0.028	0.234		
HIER	0.293	-0.538	0.327	0.084	-0.100	0.001	-0.144	
Summary statistics								
obs.	86	52	74	77	86	198	86	190
mean	2.229	0.307	28.727	0.183	7.971	15.336	0.291	0.524
std. dev.	0.517	0.153	15.267	0.041	1.641	2.088	0.457	0.342
min.	0.693	0.046	8.600	0.100	5.247	10.652	0	0.002
max.	3.045	0.652	68.800	0.315	10.555	20.949	1	0.993

Notes: This table presents the correlation matrix of variables (top panel) and their summary statistics (bottom panel) across countries.

Table 7: Trust and regulation

	OLS	OLS	OLS	TSLS	TSLS
	(1)	(2)	(3)	(4)	(5)
$TRUST$	-2.305***	-1.896***	-1.324***	-1.387***	-1.382***
	(.423)	(.454)	(.309)	(.438)	(.436)
$\ln GDP$		-.087*	-.080***	-.077***	-.077***
		(.050)	(.023)	(.030)	(.030)
$\ln POP$			.131***	.133***	.133***
			(.020)	(.019)	(.019)
$UK\ LEGAL$			-.825***	-.818***	-.818***
			(.103)	(.091)	(.091)
obs.	52	52	51	50	50
R^2	.4	.433	.816	.815	.815
F	29.715	18.376	36.203	37.016	36.986
FIRST STAGE REGRESSION FOR TRUST					
$CATHOL$				-.217***	
				(.042)	
$MUSLIM$				-.209***	
				(.083)	
$HIER$					-.216***
					(.040)
F (excl. instr.)				14.14	28.91
J				.463	
J (p-value)				.496	

Notes: This table presents OLS and TSLS estimates of the effect of trust on entry regulation across countries. The top and bottom panel report first and second stage results, respectively. The dependent variable is the (log of) number of procedures required to start a new business, from Djankov et al. (2002). The explanatory variable $TRUST$ is the country average of the measure of trust in the WVS. $\ln GDP$ and $\ln POP$ are the (log of) country GDP per capita and population in 1999, and $UK\ LEGAL$ is a dummy equal to one for British legal origin; all three variables are also from Djankov et al. (2002). The first stage instruments $CATHOL$ and $MUSLIM$ equal the fraction of people professing Catholic and Muslim religion, respectively, in 2000 (McCleary and Barro, 2006); $HIER$ is the sum of the two variables. Robust standard errors are presented (in parenthesis). The first stage F statistic for the excluded instruments and the Hansen J statistic are reported at the bottom of each column. *, ** and *** denote coefficients significantly different from zero at 90% confidence, 95% confidence and 99% confidence, respectively.

Table 8: Regulation and unofficial activity

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	TSLS (5)	TSLS (6)
$ENTRY$	14.522***	1.797	5.328**	-.114	2.257	1.075
	(2.454)	(2.591)	(2.356)	(2.188)	(3.836)	(2.742)
$TRUST$		-44.208***		-17.177	-37.425*	-35.321**
		(12.546)		(12.142)	(20.357)	(16.973)
$\ln GDP$			-6.344***	-5.859***		-4.312***
			(.999)	(1.147)		(1.439)
obs.	74	51	74	51	49	49
R^2	.254	.385	.563	.663	.409	.633
F	35.02	22.293	45.391	31.59	4.976	28.332
FIRST STAGE REGRESSION FOR ENTRY						
$\ln POP$					.195***	.161***
					(.036)	(.028)
$UK\ LEGAL$					-.967***	-.947***
					(.125)	(.095)
$HIER$					.278*	.241**
					(.145)	(.111)
F (excl. instr.)					27.64	41.03
FIRST STAGE REGRESSION FOR TRUST						
$\ln POP$					-.027**	-.014
					(.013)	(.009)
$UK\ LEGAL$					.091**	.083***
					(.044)	(.031)
$HIER$					-.202***	-.188***
					(.051)	(.036)
F (excl. instr.)					8.76	13.18
J					.36	1.553
J (p-value)					.85	.213

Notes: This table presents OLS and TSLS estimates of the effect of entry regulations on unofficial activity across countries. The top and bottom panel report first and second stage results, respectively. The dependent variable is the size of the shadow economy as a percentage of GDP, from Djankov et al. (2002). The explanatory variable $ENTRY$ is the (log of) number of procedures required to start a new business; $\ln GDP$ and $\ln POP$ are the (log of) country GDP per capita and population in 1999; $UK\ LEGAL$ is a dummy equal to one for British legal origin; all four variables are also from Djankov et al. (2002). $TRUST$ is the country average of the measure of trust in the WVS. $HIER$ is the fraction of people professing a hierarchical religion (Catholic and Muslim) in 2000, from McCleary and Barro (2006). Robust standard errors are presented (in parenthesis). The first stage F statistic for the excluded instruments and the Hansen J statistic for the over-identifying conditions are reported. *, ** and *** denote coefficients significantly different from zero at 90% confidence, 95% confidence and 99% confidence, respectively.

Table 9: Regulation and negative externalities

	OLS	OLS	OLS	OLS	TSLS	TSLS
	(1)	(2)	(3)	(4)	(5)	(6)
$ENTRY$	.013	-.018***	-.004	-.021***	-.019**	-.022**
	(.008)	(.007)	(.007)	(.007)	(.009)	(.009)
$TRUST$		-.066**		-.047	-.070	-.083*
		(.026)		(.031)	(.049)	(.047)
$\ln GDP$			-.013***	-.006**		-.004
			(.003)	(.003)		(.004)
obs.	77	50	77	50	49	49
R^2	.028	.095	.234	.156	.115	.151
F	2.667	4.408	12.409	4.588	1.987	2.705
FIRST STAGE REGRESSION FOR ENTRY						
$\ln POP$					.183***	.139***
					(.033)	(.029)
$UK\ LEGAL$					-.922***	-.901***
					(.122)	(.100)
$HIER$					.351**	.309***
					(.141)	(.116)
F (excl. instr.)					28.37	34.58
FIRST STAGE REGRESSION FOR TRUST						
$\ln POP$					-.019	-.003
					(.012)	(.010)
$UK\ LEGAL$					.069	.061*
					(.044)	(.035)
$HIER$					-.235***	-.219***
					(.051)	(.041)
F (excl. instr.)					8.92	11.46
J					.744	1.473
J (p-value)					.389	.225

Notes: This table presents OLS and TSLS estimates of the effect of entry regulations on negative externalities across countries. The top and bottom panel report first and second stage results, respectively. The dependent variable are emissions of organic water pollutant (kilograms per day per worker) for 1998, from Djankov et al. (2002). The explanatory variable $ENTRY$ is the (log of) number of procedures required to start a new business; $\ln GDP$ and $\ln POP$ are the (log of) country GDP per capita and population in 1999; $UK\ LEGAL$ is a dummy equal to one for British legal origin; all four variables are also from Djankov et al. (2002). $TRUST$ is the country average of the measure of trust in the WVS. $HIER$ is the fraction of people professing a hierarchical religion (Catholic and Muslim) in 2000, from McCleary and Barro (2006). Robust standard errors are presented (in parenthesis). The first stage F statistic for the excluded instruments and the Hansen J statistic are reported at the bottom of each column. *, ** and *** denote coefficients significantly different from zero at 90% confidence, 95% confidence and 99% confidence, respectively.

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