Regulation, Trust and Corporate Social Responsibility: A Relationship of Complementarity

Aleix Calveras[*], Juan-José Ganuza[†], and Fernando Gómez[‡]

October 2023[§]

Abstract

The prevailing view in the literature interested in the connection between regulation and trust in a given society favors the view that the thickness of regulation and prevailing levels of trust are negatively correlated (see Aghion et al. (2010)). This paper highlights instead that between trust, the enforcement of regulation, and corporate social responsibility (CSR) a positive complementarity may exist under plausible circumstances. Using a relational contracting approach, we show that regulatory enforcement reduces the misalignment of incentives between a firm and its consumers, making it easier for trust and CSR to endogenously arise.

Keywords: Relational Contracts, CSR, Trust, Regulation, Forgiveness, Institutions, Contract Enforcement.
JEL Classification: K13, K23, L51, H24.

[*]Department of Business Economics, Universitat de les Illes Balears.
[†]Department of Economics, University Pompeu Fabra.
[‡]Department of Law, University Pompeu Fabra.
[§]We wish to thank the comments from the audiences at Jornadas de Economia Industrial, the European Association of Law and Economics Annual Conference in Paris (online), and the Law and Economics Seminar at the University of Kassel. Aleix Calveras wishes to thank the grant PID2020-115018RB-C33 funded by MCIN/AEI/ 10.13039/501100011033. Juan-Jose Ganuza gratefully acknowledges the support of the Barcelona GSE Research, the government of Catalonia, and the Spanish Ministry of Science and Innovation through grant PID2020-115044GB-I00. Fernando Gomez gratefully acknowledges the financial support of the Spanish Ministry of Science and Innovation under grant PID2021-127258NA-I00. Declarations of interest: none

1 Introduction

The interaction between corporate social responsibility (CSR) or, more generally, business ethics and trust has long been recognized (Sen (1993)). To the extent that CSR fosters customers' trust in firms' good behavior and creates bonds supporting cooperation, economic efficiency, and social welfare might improve[1]. This paper further contributes to the analysis of the interplay between CSR and trust by adding regulation to the picture. We study the role that regulation plays in the interaction between CSR and trust. We do it in a relational contract framework with asymmetric information between the firm, its customers, and the regulator.

We view CSR as attaching a credence attribute to a private good (Baron (2011)). Let's think of the conditions under which a product is manufactured, including any externalities associated with production (e.g., pollution). As a consequence, to the extent that CSR is mainly driven by the demand from mindful consumers (namely, those who value the SR credence attributes and are willing to pay a higher price for a product including them), the level and accuracy of the information available to consumers is key. Absent credible information, the market might fail to provide the credence attributes desired by consumers: if consumers are uncertain about the attributes of the product, then they might not be willing to pay a premium for it and, thus, firms will not be inclined to provide such attributes in the first place (Calveras and Ganuza (2016)).[2]

Recently, various regulatory moves in Europe are trying to establish mandatory internal frameworks in firms to guarantee the provision of some of those SR attributes and to set credible external supervisory and sanctioning mechanisms: Germany passed in 2021 the Supply Chain Act (LkSG), in force since 1 January 2023, imposing extensive compliance legal obligations on German large firms to secure and enforce respect for human

[1]Psychologists have also pointed out certain drawbacks from trust, such as imprudent reliance on others and being complicit with wrongdoing by trusted individuals or groups: Bazerman (2022)

[2]Traditionally, market failure has been addressed by formal regulation: environmental externalities, for instance, have been subject to taxes, quotas, technological standards, liabilities, and penalties; recently, however, 'private politics' have complemented the 'public politics' involved in formal regulation (Baron (2003), increasing activism by consumers-citizens (and other stakeholders) on firm activity have affected the economic approach to deal with the externalities generated by firms.

rights along the entire supply chain. The EU, in turn, is discussing a Draft Directive on Corporate Sustainability Due Diligence, that mandates for large EU companies a comprehensive framework of compliance along supply chains (in Europe and outside) on human rights and environmental objectives.This proposal is expected to become law along 2024. In addition to market transparency and to sustainability regulation in corporate operations and governance, how much trust consumers place in the firm is also an important element in providing the firm with incentives to supply SR attributes attached to the product that people value. We envisage a dynamic setup where firms make a choice as to technology (to invest or not in a green and more sustainable - and expensive - production process, leading to less consumption of environmentally sensitive resources) that is not perfectly observable by the relevant population (citizens and potential customers of the firm who are concerned about sustainability). Consumers receive, however, a signal correlated with the underlying choice. Given a bad signal, they may decide to sanction the firm with reputational consequences (boycotts, social network campaigns that reduce sales for the firm), or to trust the firm despite the negative signal.

Notice our definition of trust: to "forgive" an economic agent for choices made when there is imperfect observation and there is a negative realization of the available signal. Our view is that our variable of interest is compatible and intimately related to generally accepted definitions of trust. A widely influential notion in the literature points at trust as the act of placing resources voluntarily at the disposal of another without any legal commitment from the latter, but with the expectation that the act of trust will pay off (Coleman (2009)). What consumers-citizens do in our model when they receive the signal of the firm's action concerning sustainability of its production process lies squarely within the notion presented above. It fits with the idea of relying on the ability and integrity of the firm[3]. Additionally, it also seems to be well in line with the various measurements and elicitation alternatives (surveys, experiments) used to look into to trust as a cultural trait.

[3]On various dimensions of trust (on the ability, benevolence, and/or honesty), see Mayer and Schoorman (1995), Schoorman and Davis (2007)Mayer, Davis and Schoorman (1995) and Schoorman, Mayer and Davis (2007).

We consider a relational contract model between a firm and a representative consumer in which the firm decides every period whether or not to be SR (using a green or clean technology that generates no pollution). This choice is imperfectly observed by the consumer. On the equilibrium path, even when both parties are honoring the relational contract, a bad realization of the signal received by the consumer (bad news over the firm's behavior) may trigger the imposition of a relational punishment on the firm. In this Green and Porter (1984) setting, previous literature has focused on sanctioning strategies whereby the relationship between relational parties terminates for T periods and then resumes the relationship.[4] Instead, we assume that the consumer forgives the firm with some probability and terminates forever the relationship with the complementary probability; notice that this probability of forgiveness is our measure of trust. The value of the relationship for both parties is increasing in the level of trust. We focus on the optimal relational contract of this class (with this particular grim strategy) which is characterized by maximizing the level of trust while keeping the firm under the right incentives for being socially responsible. In other words, in our setting, the level of trust is endogenous and it is an optimal response of relational parties for overcoming the problems associated with the asymmetry of information, and for maximizing the value of their relationship. As trust is an endogenous variable, we can undertake a comparative statics analysis. For example, we show that the higher the level of responsibility (ethics) across the population of consumers (the higher their willingness to pay for a SR behavior), the more likely CSR is part of the equilibrium, and the higher the level of trust we expect to observe.

Moreover, we then add to our dynamic framework an ex-post regulatory regime that aims at detecting the use of environmentally harmful technology and collecting a penalty from the infringing firm. As a consequence, even if the workings of such a regime are far from perfect, the level of trust (or forgiveness) by environmentally responsible consumers increase. For this to happen it is not necessary that potential customers learn about the outcome of the regulatory enforcement procedure; just the awareness of it being in

[4]See for example, Tirole (1988), Cabral (2005), Troya (2007), Ganuza et al. (2016) and Ganuza and Gomez (2022)

place suffices for the positive effect on the levels of trust. Thus, we observe a complementarity between activity and outcome regulation and prevailing levels of trust in society (by consumers, more specifically), at least with respect to imperfectly observable firm behaviour.[5]

1.1 Related literature

The complementarity between trust and regulation that we show in our analysis is in contrast with other papers that have argued that the general level and thickness of regulation and prevailing levels of trust are negatively correlated in reality (Aghion et al. (2010), Pinotti (2012), Algan and Cahuc (2014)). Perhaps the best known of these models is Aghion et al. (2010), in which individuals face two choices: one concern being civic or uncivic; the other concerns a career choice; namely, whether to become an entrepreneur, an activity in which uncivic agents create pollution (a negative externality), or to choose some other activity that does not directly create opportunities for the negative externality. Political and legal factors determine the level of regulation imposed upon entrepreneurs, especially when the expected size of the negative externality is substantial. Regulation may reduce negative externalities, but at the same time creates opportunities for corruption since it is implemented and enforced by state officials, who request bribes from entrepreneurs if the former are uncivic as individuals. In their model, when individuals expect that civic values will prevail in society, they anticipate low levels of regulation and corruption, and so prefer to choose to become civic. These beliefs as to the future features of society are stable since they motivate a choice of civic-mindedness, which leads to low amounts of regulation and large numbers of entrepreneurs in society. On the contrary, when individuals expect that non-civic values will prevail, they anticipate higher levels of regulation and bribery and prefer not to acquire the civic-oriented values. These beliefs are justified since the choice of becoming uncivic leads to opposite outcomes: high amounts of regulation, high levels of corruption in government, and reduced levels of

[5] In the paper we also extend the basic model to allow citizens to receive feedback, before they decide to trust the firm or not, from the regulatory process; we also, consider the possibility of Type I error in the functioning of the regulatory system.

entrepreneurial activity.

From our analysis, a more nuanced view of the interplay between trust and regulation emerges.[6] Regulation is a term that captures a rich and complex set of political and legal institutions in any given country, which presents various dimensions and facets that relate in different ways to levels of trust among individuals. In this spirit, our analysis indeed shows that different types of regulation may yield diverging results with respect to the link between regulation, trust, and CSR. In this line, Huang and Kopytov (2023) analyzes the impact of environmental regulation in a setting with socially responsible investors. Their setup consists of heterogeneous firms in their cost of adopting a clean technology and investors who differ in their trade-off between the profitability of the investments and pollution levels. They show that outcomes may worsen due to a regulation consisting of a pollution tax. The main idea is that the pollution tax makes the use of dirty technology more costly, but also makes the investors less concerned about firms' choice of technology, thus worsening firms' decisions.

In addition to the literature specifically considering the interplay between trust in society and various features of regulation, our paper is related to the economically oriented literature that inquires into the relationship between reputational and legal sanctions in markets and other interactions. The closest to our paper in this literature is Ganuza et al. (2016), which examines the relationship between a range of legal regimes for product-related accidents and problems (strict liability, negligence, and negligence with error in the determination of legal liability) and the size of the consumers' reputational sanctions imposed on firms when a the safety issue with the product arises and shows how even a pretty (but not too much, in a well-defined way,) the imperfect legal regime allows a

[6]Other models focusing on trust also provide different predictions for the interplay between trust and regulation other than that of Aghion et al. (2010). Carlin et al. (2009) design a model in which agents incur a cost in order to become decent and trustworthy (act in the best interest of their customers) as opposed to remaining untrustworthy (in which case they only care for their own self-interest). Then, customers have to decide how much to invest with an agent of an unknown type, given the fraction of agents who are decent, and thus society's overall level of public trustworthiness. Here, again, two equilibria emerge: when trustworthiness has high value for the economic interactions that may take place, tougher legal regulation reduces the rewards from trustworthiness, and displaces public trust in the market; when the reverse is true, legal regulation may increase public trust. Thus, regulation and trust may end up being substitutes or complements.

refinement of the reputational sanctions in ways that enhance efficiency. (See also Baker and Choi (2018)).[7]

One contribution of our paper is to model trust as a consumer's forgiveness probability after receiving bad news. We are not, however, the first ones to analyze forgiveness in the relational contract literature. Vanneste and Frank (2014) considers continuous performance measures in vertical relationships. Their interpretation of forgiveness is the stringency of performance thresholds that may determine the termination of the relationship. They show that more forgiving contracts (with a lower threshold) are optimal when the relationship value is high and outside options are low.[8] Ganuza and Gomez (2022) analyses a buyer-supplier relational contract setting in which in addition to the outcome of the contract, parties have access to other sources of performance information (such as scorecards). They show that forgiveness may arise as buyers may be more willing to overlook observed failures in outcomes in their dealings as long as the additional information provides evidence of traits of good behavior.

Closely related to our analysis, Bartling et al. (2021) experimentally document that trust and contract enforcement may interact as complements, leading to increased gains from trade in a principal-agent setting. Their paper, however, takes exogenous changes in trust levels among principals as given, and their various contract enforcement regimes allow for the use of screening mechanisms by principals to elicit the inherent reciprocity characteristics of the population of agents. They show that an improvement in contract enforcement generates null or only small increases in gains from trade at low levels of trust, while it may have a larger positive impact when the level of trust is higher.

In recent years, economic interest in the origin, evolution, and relevance of various cultural traits in human societies for a number of economically meaningful variables have

[7]Other relevant papers in that strand of the law and economics literature are Zasu (2007), Polinsky and Shavell (2010), Iacobucci (2014), and Shapira (2016). The latter informally details the channels through which regulation and litigation may feed and correct reputational reactions by media and consumers.

[8]In addition Vanneste and Frank (2014) provides some empirical evidence of the role of forgiveness in management. In particular, they conduct a field study on Dutch companies and report the case of a company rating suppliers using performance indicators that are largely unverifiable by outsiders (quality, delivery, responsiveness, etc.) and aggregating these indicators in a simple "traffic light" score: green (performing), yellow (under-performing), or red (unacceptable). Suppliers with yellow lights are somehow forgiven and only the red light leads to the termination of the relationship.

increased enormously and produced a flourishing literature. Among the cultural phenomena with economic significance, societal trust has attracted a good deal of attention, and its importance for institutions and economic performance in several domains (financial markets, labor markets, firm organization, firm resilience to banking crisis, innovation, regulation, to name a few) is very often highlighted in recent economic research: Guiso L. and Zingales (2006), Seabright (2010), Algan and Cahuc (2014), Alesina and Giuliano (2015), Levine and Xie (2018).[9]

The paper is organized as follows. In section 2 we present motivating empirical evidence for our analysis with regards to the relationship between trust, CSR and various dimensions of public regulation. In section 3 we present the basic model of CSR and trust in the absence of regulation; then, the second part of the section introduces a regulatory scheme and apparatus and shows how key dimensions of regulation increase levels of trust by consumers and CSR. As we want to illustrate our main idea in the simplest possible way, we have adapted as a model of trust by customers on firms a simplified version of the collusion model of Green and Porter (1984). Section 4 then extends the basic model in various directions: (i) including observation by consumers of the outcomes of the regulatory fact-finding and sanctioning process, (ii) including a more comprehensive setting of regulatory mistakes, and (iii) allowing for various levels of consumer ethics. Finally, section 5 briefly concludes.

2 Motivating evidence

To further motivate the interest of our analysis, in this section, we show evidence with cross-section data at the country level that the relationship between CSR, trust, and regulation depends on the type of the latter. Thus, with data from the Rule of Law Index of the World Justice Project, we find that 'regulatory enforcement' is positively correlated with trust (as measured by the World Value Survey), a different sign of that shown in Aghion et al. (2010) with 'regulatory intervention'. This positive correlation

[9]High levels of trust may have also a negative side in terms of the functioning of institutions.Anguera-Torrell (2020) points out that trust may facilitate welfare-enhancing transactions between agents but also corruption agreements.

(without any claim with regards to causality) simply illustrates the theoretical analysis that will follow, namely that more reliable institutions for regulatory enforcement are conducive to higher levels of CSR and trust by citizens, pointing to the existence of complementarity among them.

Table 1: Description of Variables

Var.	Definition and source
Trust	It measures the degree of confidence of the citizens of a country from the World Value Survey (WVS) in its fifth wave (years 2005-2009, specifically the survey was implemented in the years 2005-2006). The measure of the degree of trust in the country is obtained from the answers to the question: "Generally speaking, would you say that most people can be trusted or that one must be very careful in dealing with others?", with two possible answers:" (i) You can trust most people "; and "(ii) You have to be very cautious." The trust indicator measures the percentage of responses (i) in the country indicating that most people can be trusted. This is exactly the same measure of trust as that used in Aghion et al. (2010).
CSR	Index of the level of corporate social responsibility in the country. In the document "The State of Responsible Competitiveness 2007", the authors develop the Responsible Competitiveness Index 2007, measuring for a series of countries the factors that would determine the "responsible competitiveness" of the country in question.[10] The Responsible Competitiveness Index 2007 includes three sub-indices that, according to the authors, contribute to the responsible competitiveness of a country: (i) country policies ('policy drivers'), (ii) business practices ('business action '), and (iii) social enablers (or social environment). The second sub-index, 'business action', is the one that best approximates the SR level of companies in a country, including from different sources a series of measures on the ethical behaviour of firms in the country, equal pay for similar jobs, and the ISO certifications ratio. This business action sub-index is our CSR index by country. Specifically, in the Report, available online, the different variables included in the sub-index (as well as their sources) are detailed: effectiveness of the board of directors, the ethical behaviour of the firms, equality of salaries for similar jobs, strength of the standards of accounting and auditing, the degree of training of personnel, the ratio of ISO certifications, and industrial accidents.
Regulation	It measures the intensity of regulation at the country level through the indicators developed by the OECD at a general level of the economy (Koske et al., 2015). We use the data on product market regulation for the year 2008, which summarizes a wide variety of existing regulations throughout the countries. This is one of the measures of regulation used by Aghion et al. (2010).
Reg Enforcement	It measures the extent to which regulations are fairly and effectively implemented and enforced. Among the items included are whether these regulations and administrative provisions are enforced effectively and are applied and enforced without improper influence by public officials or private interests. Additionally, whether the administrative proceedings are conducted timely, without unreasonable delays, that due process is respected in administrative proceedings, and that there is no expropriation of private property without adequate compensation. The data is obtained from Rule of Law Index of The World Justice Project, for year 2010.

Let us first explain precisely in Table 1 the source of the data we use in this stylized and

illustrative empirical analysis. [11] Table 2 shows the correlations among the variables used in the analysis. As shown in Table 2 and Figures 1 and 2, the relationship (correlation) between trust and regulation depends on the type of the latter, on the way it is measured. While correlation is negative when measured by the OECD (product market regulation, Figure 1, analogous to that in Aghion et al. (2010)), it is positive when considering Regulatory Enforcement. The level of regulation considered in Figure 1 relates to the time and steps needed to run a business in compliance with the regulation; for instance, but not only, so as to start a business. Thus, such regulation generates costs for the firm. As a consequence, as stated in Aghion et al. (2010) in those countries where individuals (managers) show a higher level of trust (civicness) such regulation is less necessary. A higher level of 'regulatory enforcement', instead, is positively correlated with trust as shown in Figure 2. As our analysis will show, the belief that the regulatory administration is a a well functioning one would make it more likely and optimal that a partner trusts the business with which it is interacting, pointing thus to trust and regulatory enforcement as being complementary.

Table 2: Correlations among the variables

	Variables			
	CSR	**Reg**	**Reg Enf**	**Trust**
CSR	1			
Regulation	-0.605***	1		
Reg Enforcement	0.843***	-0.775***	1	
Trust	0.660***	-0.337*	0.730***	1

*p<.1, **p<.05, ***p<.01

[11] Please notice that all data is from years around 2007-2010 mainly because this is the period for which we have country data on CSR; moreover, this allows us to use the data for the same time period as that of Aghion et al. (2010).

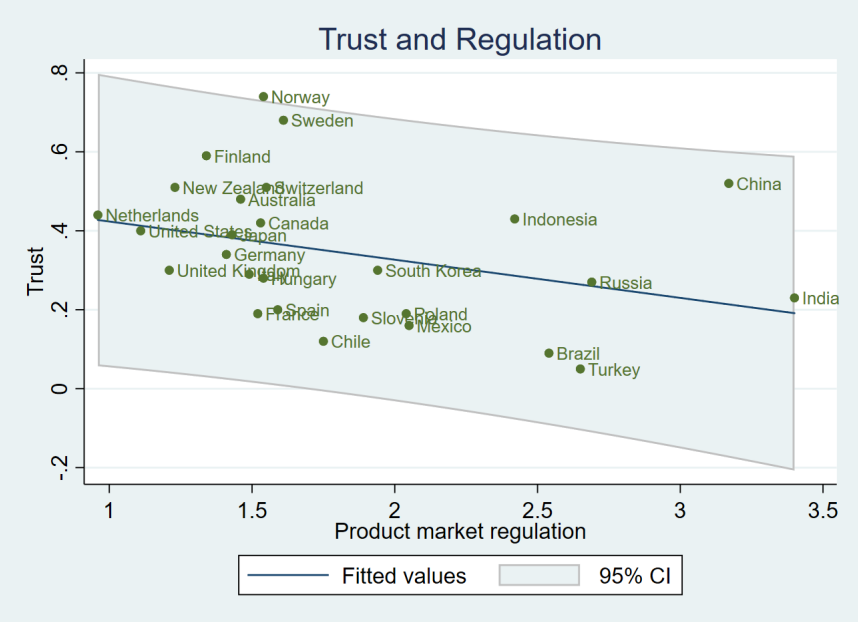

Figure 1: Trust and Regulation

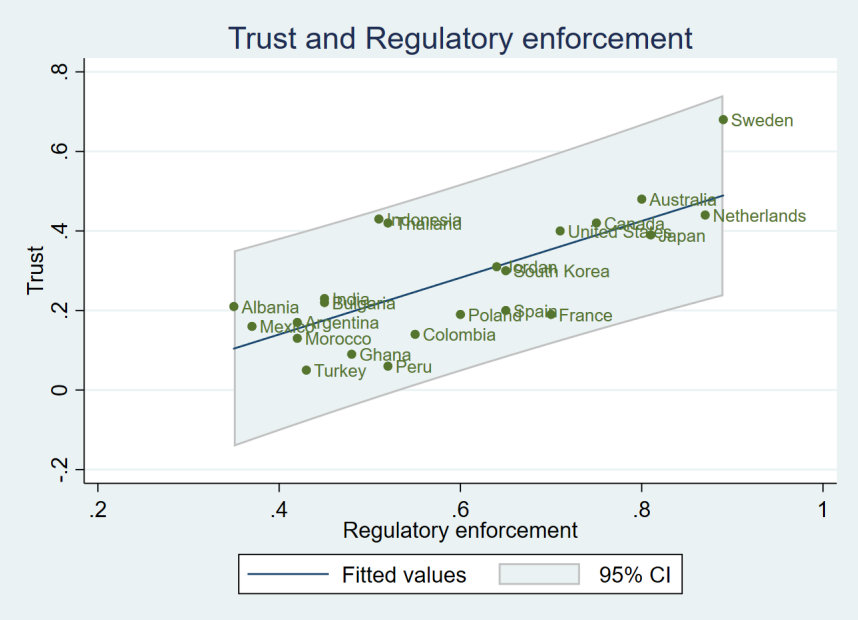

Figure 2: Tust and regulatory enforcement

Finally, notice that Figure 3 and Table 2's correlations also show a strong and statistically significant positive correlation between CSR and 'regulatory enforcement', a relationship that our theoretical analysis will also suggest is one of complementarity.

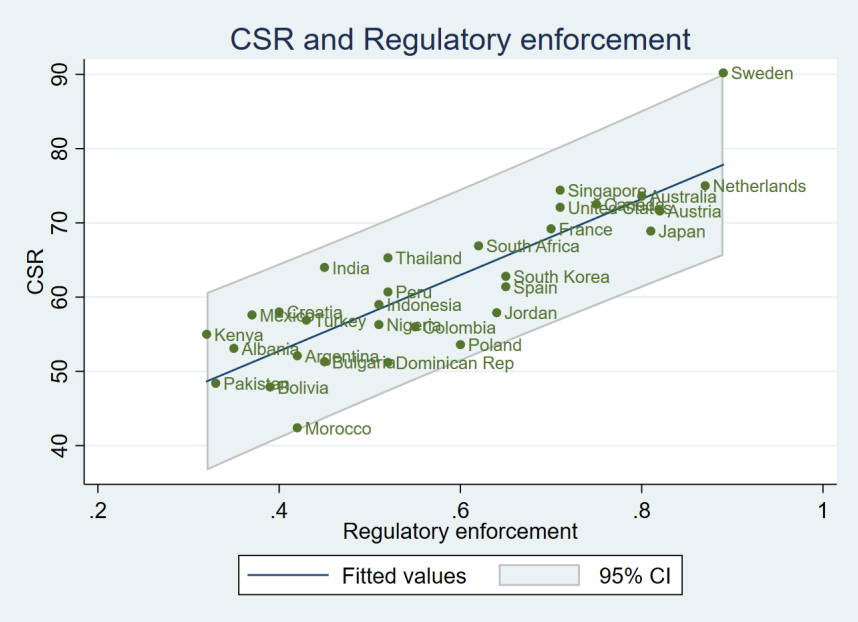

Figure 3: CSR and regulatory enforcement

3 The Model

There is a perfectly competitive fringe of firms producing a good with a costless ($c = 0$) dirty technology, and generating externality $b > 0$. One firm (the "firm" henceforth) has access to a clean technology that entails a higher cost $c > 0$, but generates no externality.[12] Producing with clean technology is socially efficient $b > c$.

A representative responsible consumer values the good at u, and internalizes the externality b, if present (with corresponding utility $u - b$). Consumer will buy from a firm that is using clean technology with no externality at price p if: $u - p > u - b$. We take, for the time being, the firm's price p as exogenous: $c < p < b$.

The choice of technology and the externality are imperfectly observed by consumers after purchase. Formally, the representative consumer, if buying the product, receives a correlated signal $s \in \{s_C, s_D\}$, where $p(s_C|C) = p(s_D|D) = \gamma \in (\frac{1}{2}, 1]$. The accuracy of the signal (market transparency) is an inverse measure of the asymmetric information in the firm-consumer relationship and it can be related to the activity of NGOs, media attention, certifications, etc.

[12]Parameter $b > 0$ could be alternatively interpreted as the pollution differential between the dirty and clean technology. That is, b_D and b_G could indicate the pollution intensity of each technology, and $b = b_D - b_G$ may capture the pollution differential between both technologies.

In a static framework, in which first the firm decides the technology and the consumer decides whether or not to buy the good without information over technology and the associated externality, there would be no trade: the consumer correctly anticipates that the firm has strong incentives to shirk (using dirty technology).

There are several ways to solve this market failure. We concentrate on two: (i) Regulation may provide sufficient incentives for the firm to choose the low externality technology, and (ii) Market reputation in the relational contract between the firm and the representative consumer may also do the job.

We now focus on this reputational mechanism by placing the interaction between the firm and the representative consumer in a dynamic framework in which the firm chooses the technology of production every period, $t \in \{C, D\}$ and the representative consumer takes her purchasing decisions taking into account the imperfectly observed past performance of the firm.

3.1 Dynamic Market Incentives

Now we consider an infinite horizon framework with an infinitely lived firm and an infinitely lived representative consumer, in which the basic game above is repeated over and over again. We start by considering that there is no external regulation and only market reputation incentives (relational contracts) are in place.

This repeated game has multiple equilibria, including the repetition of the no-trade equilibrium of the static game. We will focus on equilibria supporting the efficient trade equilibrium between the firm and the representative consumer (where the firm chooses the clean technology and the consumer buys). In particular, we consider the following strategies as candidates to be a Nash equilibrium of the repeated game. Parties start cooperating. The firm chooses a clean technology and the representative consumer starts trusting the firm in period 1, and buying the product at price p. The representative consumer continues to do so until a bad signal arrives. Then, the representative consumer decides whether to stop trading forever or to forgive the firm, according to a forgiveness probability λ. Then, with probability $(1 - \lambda)$, the trade relationship finishes and with

probability λ the next period both parties cooperate again.

We are in a setting of ex-post imperfect information since the signal over the technology/externality is imperfect. This explains why some forgiveness can be optimal. If the signal were perfect, then λ could be zero and the trade relationship would never finish. We will focus on the "optimal" relational contract in this family, the one that minimizes the probability of finishing the relationship.

This relational contract is optimal within the set strategies described above, but it is not globally optimal. As in Green and Porter (1984) (and also in our setting) alternative and more complex strategies exist that generate equilibria in which parties get a higher surplus[13]. However, this "forgiveness" strategy is appealing, since it summarizes in a single variable λ the inefficiencies of the relational contract due to the imperfect monitoring of effort, and more importantly, it captures well the concept of trust. Despite a bad signal realization, the representative consumer can still trust the firm in equilibrium.

We assume that both agents face the same discount factor, $\delta \in (0, 1)$. Let V^+ be the present discounted value of firm's profits if it chooses the clean technology

$$V^+ = p - c + \delta \left(\gamma V^+ + (1-\gamma)(\lambda V^+ + (1-\lambda)0\right) \tag{1}$$

where $p - c$ denotes current profits. The second term measures expected discounted profits. First, V^+ represents the expected payoffs from a good signal, which occurs with probability γ (when the clean technology is used). $1 - \gamma$ is the probability that the consumer receives a bad signal, even though the firm invested in clean technology. In that scenario, the consumer forgives (trusts) the firm with probability λ, while with the complementary probability, the consumer stops trading forever. This expression simplifies to

$$V^+ = p - c + (1-\gamma)\,\lambda\delta V^+ + \gamma\delta V^+ \tag{2}$$

and, solving for V^+, yields

[13]For example, in the line of Green and Porter (1984), we could also consider that trade is interrupted for a finite number of periods after a bad signal realization.

$$V^+ = \frac{p - c}{1 - \delta((1-\gamma)\,\lambda + \gamma)} \tag{3}$$

Notice that this discounted value is increasing in the forgiveness probability and also in the accuracy of the signal. However, preserving cooperation requires the following incentive compatibility constraint (ICC) to be satisfied

$$V^+ \geq p + \gamma\lambda\delta V^+ + (1-\gamma)\delta V^+$$

Using the expression of the present discounted value of firm's profits in equation 2, we rewrite the ICC constraint as

$$p - c + (1-\gamma)\,\lambda\delta V^+ + \gamma\delta V^+ \geq p + \gamma\lambda\delta V^+ + (1-\gamma)\delta V^+$$

This simplifies to

$$\delta\,(1-2\gamma)\,(\lambda - 1)V^+ \geq c.$$

Using the expression of V^+ in equation 3, the ICC becomes

$$\frac{(p-c)(\delta\,(2\gamma-1)\,(1-\lambda)}{1 - \delta((1-\gamma)\,\lambda + \gamma)} \geq c.$$

Let $\Phi(\lambda)$ be the left side of the ICC above

Lemma 1. $\Phi(\lambda)$ *is decreasing in* λ.

Intuitively, the incentive compatibility constraint is less likely to be satisfied the higher the probability of forgiveness. Hence, we want to choose λ in order to maximize V^+ subject to the ICC; that is,

$$\max_{\lambda}\ V^+ = \max_{\lambda}\ \frac{p - c}{1 - \delta((1-\gamma)\,\lambda + \gamma)} \tag{4}$$

subject to

$$\Phi(\lambda) \geq c.$$

As the objective function is increasing in λ and $\Phi(\lambda)$ is decreasing in λ, the optimal λ^* will be the maximum λ that satisfies the ICC, $\Phi(\lambda^*) = c$. This equation has a unique solution by Lemma 1, The following Proposition characterizes this optimal forgiveness probability

Proposition 1. *The optimal probability of forgiveness (trust) is*

$$\lambda^* = 1 - \frac{c(1-\delta)}{[(p-c)\delta\,(2\gamma-1) - c\delta\,(1-\gamma)]}$$

with λ^* increasing in γ and δ.

The intuitions behind these results are the following. More accuracy increases the reputational sanction misbehavior, enhancing incentives and allowing to increase the probability of forgiveness. By the same token, a higher discount factor also increases incentives for good behavior since it increases the perceived sanction (the foregone future trade profits in present terms).

Finally, notice that λ^* maximizes the probability of trade conditional on the firm having incentives to adopt the clean technology in every period. While this maximizes the firm's long-term profits, it also maximizes consumer welfare (given that we are assuming $u - c > u - p > u - b$) and then total welfare.

3.2 Regulation

Now, we introduce regulation that may impose some penalty or fine of size k on the firm when it generates a negative externality. The enforcement of such a regulatory regime is not perfect: the regulator detects the negative externality only with probability α. Then, if the firm chooses a dirty technology it incurs an additional expected cost of αk.

Now we compute the optimal stationary CSR relational contract within this regulatory framework. The regulatory penalty may only be imposed when the externality is high, it does not affect the continuation value of investing in the clean technology V^+ but it does influence the incentive compatibility constraint.

$$V^+ \geq p + \gamma\lambda\delta V^+ + (1-\gamma)\delta V^+ - \alpha k$$

Following similar computations as above, we can characterize the optimal forgiveness probability under regulation λ_R^* as the maximum λ that satisfies the previous ICC.

$$\lambda_R^* = 1 - \frac{(c-\alpha k)(1-\delta)}{[(p-c)\delta\,(2\gamma-1) - (c-\alpha k)\delta\,(1-\gamma)]}$$

The following result states that when the regulatory penalties are imposed, we observe that λ_R^* is increasing in αk,

Proposition 2. *The probability of forgiveness (trust) λ_R^* is increasing in the penalty k and the probability of enforcement α.*

The intuition goes in line with previous comparative static results: regulatory penalties increase the incentives for good behavior and this reduces the need to rely on sanctions in the relational contract.[14]

The immediate corollary of Proposition 2 states the complementarity between regulation and trust/forgiveness.

Corollary 1. *Forgiveness (trust) is higher under regulation than without it; that is, $\lambda_R^* > \lambda^*$.*

Regulation increases the continuation value of choosing clean technology, and thus it reduces the need for punishment, increasing the overall value of the relationship.

4 Extensions

It is interesting to explore several extensions to the base model. In particular, how the forgiveness (trust) of consumers depends on (i) a regulatory penalty being observed (consumers can condition their sanctioning strategy to whether or not the penalty has been imposed), (ii) the quality of the regulation in terms of decision errors, and (iii) the degree of responsibility of consumers.

4.1 Observability of the regulatory penalty

If consumers observe the regulatory penalty, they learn that the firm has used dirty technology. Then, in order to maximize incentives for the firm to invest, they should maximize the reputational sanction in such cases: if a penalty is observed, consumers

[14]We consider that the probability of detection α is independent of the signal accuracy γ. If there is a positive correlation between both variables, as both increase the equilibrium level of trust, they would reinforce each other and the comparative statics over the two variables would hold.

will not buy again from the firm. As in the previous regulatory case, this possibility does not affect the continuation value of the clean technology but only the incentive compatibility constraint.

$$V_{OR}^{+} \geq p + (1-\alpha)[\gamma\lambda\delta V_{OR}^{+} + (1-\gamma)\delta V_{OR}^{+}] - \alpha k$$

Notice that this incentive compatibility constraint takes into account that when a penalty is imposed on the firm, in addition to the penalty, the firm loses any future trade profits. Using similar computations to the above, we can characterize the optimal forgiveness probability in this setting.

$$\lambda_{OR}^{*} = 1 - \frac{(c-\alpha k)(1-\delta)}{(P-c)\delta((2\gamma-1)+\alpha(1-\gamma)) - (c-\alpha k)\delta\,(1-\gamma)}$$

The next proposition states that when the representative consumer receives feedback and can tailor the relational punishment better, it can increase the probability of forgiveness and thus the value of the relationship.

Proposition 3. *Forgiveness (trust) is higher when the representative consumer may observe the regulatory penalty,* $\lambda_{OR}^{*} > \lambda_{R}^{*}$.

The intuition is that the overall punishment for bad behavior increases, making the ICC easier to be satisfied. Then, the maximum forgiveness probability compatible with incentives is higher than when the penalty is not observed.

4.2 Quality of regulation and decision errors

We can measure the quality of the regulatory system in place by its decision errors. In the benchmark regulatory case, we consider α as a measure of enforceability that can be regarded as an inverse measure of type II error (with probability $1-\alpha$, the regulator acquits a guilty firm). Now, we introduce in the analysis the possibility of type I error: with probability β, the regulator penalizes a firm that uses clean technology.

The possibility of a type I error reduces the value of the relationship. Let V_{E}^{+} be the present discounted value of the firm profits in such case when it chooses the clean technology

$$V_{E}^{+} = p - c + (1-\gamma)\,\lambda\delta V_{E}^{+} + \gamma\delta V_{E}^{+} - \beta k \tag{5}$$

Then

$$V_E^+ = \frac{p - c - \beta k}{1 - \delta((1-\gamma)\lambda + \gamma)}$$

Type I error not only reduces the value of the relationship but also undermines incentives.

$$P - c + (1-\gamma)\lambda\delta V_E^+ + \gamma\delta V_E^+ - \beta k \geq P + \gamma\lambda\delta V_E^+ + (1-\gamma)\delta V_E^+ - \alpha k$$

This leads to a lower probability of forgiveness than in the benchmark regulatory case. Increasing the probability of Type I error reduces trust (the probability of forgiveness) for the same token that in Proposition 2, trust was increasing in α (decreasing in the probability of Type II error).

$$\lambda_E^* = 1 - \frac{(c - (\alpha - \beta)k)(1-\delta)}{(P-c)\delta((2\gamma - 1) - (c - (\alpha - \beta)k)\delta(1-\gamma)}$$

Finally, as long as, the probability of penalizing a firm that uses a dirty technology is larger than the probability of penalizing a clean firm, regulation increases trust.

Proposition 4. *If $\alpha > \beta$, forgiveness (trust) is higher under regulation than without it; that is, $\lambda_E^* > \lambda^*$.*

As long as $\alpha > \beta$, the regulation provides additional incentives for good behavior, and then the required punishment for keeping cooperation is lower.

4.3 Consumer responsibility and trust

In the benchmark model, we have assumed that the representative consumer fully internalizes the externality produced by the firms, and we have taken the price as given. Now we assume that the consumer internalizes the externality only up to a point $\theta \leq 1$. Then, with the dirty technology, the consumer's willingness to pay is $u - \theta b$. The representative consumer will buy from the firm that is using the clean technology with no externality at price p if: $u - p > u - \theta b$. Then, the existence of the clean equilibrium requires $p \in [c, \theta b]$. We endogenize the price assuming that the firm's bargaining power is μ and $p = \mu\theta b + (1-\mu)c$. This reduced form delivers the natural result that the p for the clean

technology is increasing with the level of responsibility of consumers, θ. The surplus of the relationship between the firm using clean technology and consumers depends on how much they value (dislike) the negative externality of the alternative dirty production process. This relationship leads to the interesting insight that higher consumer responsibility θ generates more trust λ: values and trust move together. This is stated in the following proposition

Proposition 5. *Forgiveness λ^* is increasing in consumer's responsibility (ethics) θ.*

This result is due to the fact that p increases with θ, and λ^* increases with p; then λ^* increases with θ.

5 Conclusions

We have analyzed the role of trust in the interaction between consumers and socially responsible firms. CSR is often related to attributes of the product or the production process that are hardly observable by consumers. For overcoming the potential conflicts that naturally arise in this asymmetric information setting, consumers and socially responsible firms build a trust relationship (relational contracts). The first contribution of the paper is to summarize in a single trust variable the quality of these relational contracts. We model trust by the probability of forgiving the firm when consumers receive bad news about the firm's behavior. This characterization of trust seems very close to the empirical measures of trust from attitudinal survey questions. Using these measures, previous literature has shown a negative relationship between trust and regulation. Aghion at al (2010) explains this negative relationship by pointing out that regulation is a costlier substitute for trust for reducing externalities. We, on the contrary, show that there is a complementarity between trust and regulation. When regulation is in place, consumers anticipate that firms have more incentives to be socially responsible and then they are more prone to build a trust relationship. We illustrate this insight with cross-country trust and regulation data.

A Appendix

Proof of Lemma 1: We directly differentiate the function $\Phi(\lambda)$:

$$\begin{aligned}\Phi(\lambda)' &= (p-c)(\delta\,(2\gamma-1)\,\frac{-1+\delta((1-\gamma)\,\lambda+\gamma)+\delta((1-\gamma)\,(1-\lambda)}{\left[1-\delta((1-\gamma)\,\lambda+\gamma)\right]^2}\\ &= (p-c)(\delta\,(2\gamma-1)\,\frac{-1+\delta\gamma+\delta\,(1-\gamma)}{\left[1-\delta((1-\gamma)\,\lambda+\gamma)\right]^2}\\ &= -(p-c)(\delta\,(2\gamma-1)\,\frac{(1-\delta)}{\left[1-\delta((1-\gamma)\,\lambda+\gamma)\right]^2}<0.\square\end{aligned}$$

Proof of Proposition 1: First, we characterize the optimal probability of forgiveness by making binding the incentive compatibility constraint:

$$\begin{aligned}\frac{(p-c)\delta\,(2\gamma-1)\,(1-\lambda)}{1-\delta((1-\gamma)\,\lambda+\gamma)} &= c\\ (p-c)(\delta\,(2\gamma-1)-c(1-\delta\gamma) &= \grave{\lambda}[(p-c)\delta\,(2\gamma-1)-c\delta\,(1-\gamma)]\\ \lambda^* &= \frac{(p-c)\delta\,(2\gamma-1)-c(1-\delta\gamma)}{[(p-c)\delta\,(2\gamma-1)-c\delta\,(1-\gamma)]}\\ \lambda^* &= 1-\frac{c(1-\delta)}{[(p-c)\delta\,(2\gamma-1)-c\delta\,(1-\gamma)]}\end{aligned}$$

Then, deriving with respect to γ and δ

$$\frac{\partial\lambda^*}{\partial\gamma}=\frac{[2(p-c)\delta+c\delta][c(1-\delta)]}{[(p-c)\delta\,(2\gamma-1)-c\delta\,(1-\gamma)]^2}\geq 0$$

$$\frac{\partial\lambda^*}{\partial\delta}=\frac{c}{\delta^2[(p-c)\,(2\gamma-1)-c\,(1-\gamma)]^2}\geq 0.\square$$

Proof of Proposition 2: We directly differentiate the probability of forgiveness (trust) under regulation with respect to k (the proof with respect to α is identical):

$$\frac{\partial\lambda_R^*}{\partial\alpha k}=\frac{(c-\alpha k)(1-\delta)(p-c)\delta\,(2\gamma-1)}{[(p-c)\delta\,(2\gamma-1)-(c-\alpha k)\delta\,(1-\gamma)]^2}\geq 0.\square$$

.

Proof of Corollary 1:

This is a direct implication of Proposition 2 since λ^* is just a limit case of λ_R^* when for example $\alpha=0$. $\square$

proof of Proposition 3.

We first characterize the optimal forgiveness probability λ^*_{OR} when the regulatory payment is observed. In order to do so, we have to find the λ^*_{OR} that makes the incentive compatibility constraint binding.

$$V^+ = p + (1-\alpha)[\gamma\lambda^*_{OR}\delta V^+ + (1-\gamma)\delta V^+] - \alpha k$$

$$p - c + (1-\gamma)\,\lambda^*_{OR}\delta V^+ + \gamma\delta V^+ = p + (1-\alpha)[\gamma\lambda^*_{OR}\delta V^+ + (1-\gamma)\delta V^+] - \alpha k$$

$$\delta[(\lambda + \gamma(1-\lambda^*_{OR})) + (1-\alpha)(1-\gamma(1-\lambda^*_{OR})]V^+ = c - \alpha k$$

Now, we plug in the continuation value of using the clean technology, $V^+ = \frac{p-c}{1-\delta((1-\gamma)\lambda^*_{OR}+\gamma)}$ that does not change in this case,

$$\frac{(p-c)\delta[(1-\lambda^*_{OR})((2-\alpha)\gamma - 1) + \alpha)]}{1-\delta((1-\gamma)\,\lambda^*_{OR} + \gamma)} = c - \alpha k$$

Clearing λ^*_{OR} from the previous equation, we obtain

$$\begin{aligned}
\lambda^*_{OR} &= \frac{(p-c)\delta((2-\alpha)\gamma - 1) + \alpha) - (c-\alpha k)(1-\delta\gamma)}{[(p-c)\delta((2-\alpha)\gamma - 1) + \alpha) - (c-\alpha k)\delta\,(1-\gamma)]} \\
&= 1 - \frac{(c-\alpha k)(1-\delta)}{[(p-c)\delta((2-\alpha)\gamma - 1) + \alpha) - (c-\alpha k)\delta\,(1-\gamma)]} \\
&= 1 - \frac{(c-\alpha k)(1-\delta)}{(p-c)\delta((2\gamma - 1) + \alpha(1-\gamma)) - (c-\alpha k)\delta\,(1-\gamma)}
\end{aligned}$$

Finally $\lambda^*_{OR} > \lambda^*_R$ since the denominator $(p-c)\delta((2\gamma-1)+\alpha(1-\gamma))-(c-\alpha k)\delta\,(1-\gamma)$ is higher than the denominator of λ^*_R which is $(p-c)\delta\,(2\gamma-1)-(c-\alpha k)\delta\,(1-\gamma)$.□

PROOF OF PROPOSITION 4. This is again a direct implication of Proposition 2 since λ^*_R was increasing in α and then trust is also increasing in $\alpha - \beta$.□

PROOF OF PROPOSITION 5 This follows from the arguments of the main text. The result is due to the fact that p increases with θ, and λ^* increases with p, and then λ^* increases with θ.□

References

Aghion, P., A. Y., C. P., and A. Shleifer (2010). Regulation and distrust. *Quarterly Journal of Economics, 125 (3)*, 1015–1049.

Alesina, A. and P. Giuliano (2015). Culture and institutions. *Journal of Economic Perspectives, 53 (4)*, 898–944.

Algan, Y. and P. Cahuc (2014). Trust, growth and well-being: New evidence and policy implications. *Handbook of Economic Growth, 2*, 49–120.

Anguera-Torrell, O. (2020). Entrepreneurship, trust and corruption. *European Journal of Political Economy, 65*, 101937.

Baker, S. and A. H. Choi (2018). Reputation and litigation: Why costly legal sanctions can work better than reputational sanctions. *Journal of Legal Studies, 47 (1)*, 45–82.

Baron, D. (2003). Private politics. *Journal of Economics & Management Strategy, 12*(1), 31–66.

Baron, D. (2011). Credence attributes, voluntary organizations, and social pressure. *Journal of Public Economics, 95 (11)*, 1331–1328.

Bartling, B., E. Fehr, D. Huffman, and N. Netzer (2021). The complementarity between trust and contract enforcement. *Working Paper, Department of Economics, University of Zurich*.

Bazerman, M. H. (2022). Complicit. how we enable the unethical and how to stop. *Princeton University Press.*.

Cabral, L. (2005). The economics of trust and reputation: A primer. *Mimeo*.

Calveras, A. and J.-J. Ganuza (2016). The role of public information in corporate social responsibility. *Journal of Economics & Management Strategy, 25 (4)*, 990–1017.

Carlin, B., F. Dorobantu, and S. Viswanathan (2009). Public trust. *Journal of Financial Economics, 92 (3)*, 321–341.

Coleman, J. (2009). Foundations of social theory. *Harvard University Press.*.

Ganuza, J.-J. and F. Gomez (2022). Designing relational sanctions in buyer-supplier relationships. *Journal of Economics & Management Strategy, 31*, 470–491.

Ganuza, J.-J., F. Gomez, and M. Robles (2016). Product liability versus reputation. *The Journal of Law, Economics, and Organization, 32 (2)*, 213–241.

Green, E. and R. Porter (1984). Noncooperative collusion under imperfect price information. *Econometrica. 52*, 87–100.

Guiso L., P. Sapienza, P. and L. Zingales (2006). Does culture affect economic outcomes? *Journal of Economic Perspectives. 20(2)*, 23–48.

Huang, S. and A. Kopytov (2023). Sustainable finance under regulation. *Working Paper, The University of Hong Kong at SSRN*.

Iacobucci, E. M. (2014). On the interaction between legal and reputational sanctions. *Journal of Legal Studies 43 (1)*, 189–207.

Levine, R., C. L. and W. Xie (2018). Corporate resilience to banking crises: The roles of trust and trade credit. *Review of Economics and Statistics 53 (4)*, 1441–1477.

Mayer, R. C., J. H. D. and F. D. Schoorman (1995). An integrative model of organizational trust. *The Academy of Management Review, 20 (3)*, 709–734.

Pinotti, P. (2012). Trust, regulation and market failures. *Review of Economics and Statistics 94 (3)*, 650–658.

Polinsky, A. M. and S. Shavell (2010). The uneasy case for product liability. *Harvard Law Review 123*, 1437–1492.

Schoorman, F.D., M. R. C. and J. H. Davis (2007). An integrative model of organizational trust: Past, present and future. *The Academy of Management Review, 32 (2)*, 344–354.

Seabright, P. (2010). The company of strangers. a natural history of economic life, 2nd. ed. *Princeton University Press.*.

Sen, A. (1993). Does business ethics make economic sense? *Business Ethics Quarterly, 3(1)*, 45–54.

Shapira, R. (2016). Reputation through litigation: How the legal system shapes behavior by producing information. *Washington Law Review, 95*, 1193–1252.

Tirole, J. (1988). Industrial organization. *MIT Press*.

Troya, M. (2007). The dynamics of productivity in the telecommunications equipment industry. *International Journal of Industrial Organization 52*, 333–357.

Vanneste, B. and D. Frank (2014, January). Forgiveness in vertical relationships: Incentive and termination effects. Organization Science, 25.

Zasu, Y. (2007). The uneasy case for product liability. *Journal of Legal Studies 36*, 379–396.