Corporate Social Responsibility: Can Markets Discipline?*

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Abstract

Can consumer markets dicipline firms' behavior? In the model of the paper, firms have an option of choosing between two strategies, i.e. adopting a costly ethical code or not. Consumers with moral preferences monitor firms imperfectly. Firms with no ethical code can successfully mimick ethic firms attracting customers. The detected deviants are punished by consumers paying a lower price. Conditions are stated when a mutant firm with an ethical code can successfully invade the population of firms with no ethical code. Deviant large firms have a greater probability of being detected than deviant small firms; therefore, they serve moral consumers. Consumers tend to subject of a herd effect which creates a dynamic meme effect. Firms expectations may give rise to multiple equilbria.

Key words: corporate social responsibility, firm size, detection probability

1 Introduction

The idea of Corporate Social Responsibility has been actively debated in social sciences and business economics. The discussion has been exclusively

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normative. In economics, it has been much less an issue. In his widely cited early writing, Friedman (1970) advocated his influential normative view that the sole responsibility of firms is to make a profit. In analytical economics, the normative environmental economics has addressed the question of optimal taxation of production externalities. Severe real world phenomena, however, have provided fire on the flames of the discussions on firms' ethics. The large and wide spread scandals in the US capitalism detected around 2000 were striking. The betrayers of capitalism included Enron, Arthur Andersen, Worldcom, Merck, AOL Time Warner, Xerox and others. The economic recession since 2008 resulting from the uncontrolled financial market sicknesses is not yet over. The oil scandal caused by BP at the Mexican Gulf is a further example. The capitalistic market economy appears as a subject of a paradox: the invisible hand has resulted in prosperity and an income level which is ten times higher than it used to be no more than one hundred years ago but the price of the profit motive has often resulted in shaky business ethics.

An economic analysis of Corporate Social Responsibility is largely missing. This may result from that economists very well understand that there is no real alternative for profit maximization. Indeed, Tirole(2000) convincingly warned against adopting some targets other than wealth maximization in corporate decision making. A fact, however, appears to be that *the image of firms plays in business today a role which it did never before.* Firms openly and persuasively advocate in their cover home page their values. They highlight in particular that their production is environmentally friendly, that their personnel policy is sound, they abstain from using child labor, they provide charity etc. All such actions divert their economic resources away from their core business areas. This is a new phenomenon and there must be an economic rationale for it. Earlier, large multinational firms were criticized for exploiting both people and the environment in developing countries. Such allegations have legitimacy. The chemical firm Union Carbide, caused a large human catastrophe in Bhopal India in 1984, leading to some 2,500 deaths and to and environmental damage. Companies like Nestle and Shell have long suffered from lost reputation from their presence in the developing world. Manufacturers of paper have been criticized for damaging rain forests. The alleged misuse of child labor has been heard though less so recently. Companies moving their production to China have been criticized for firing domestic labor. Tax evasion and resorting to grey market transactions represent further examples.

Economists have evaded taking normative positions so typical among

other social scientists. Is there is a room for an economic analysis of CSR? Instead of taking an ex ante normative position an economist can ask: can markets discipline firms' behavior? This is a positive research question. Such a discipline may be imposed - if by any - by consumer markets, by the own workers of corporations, or by capital markets pricing the assets of firms. Eeconomics has its virtue: it can rephrase the question to make it a subject of an analysis!

There are signs that the world has changed and that consumers have been activated. The increasing concerns of climate change have activated people. The times have gone when large multinational corporations had free hands in the developing countries to dump their waste and cause damage to the environment with no punishment.[1] The success of the fair trade products speaks for the consumers' willingness to pay a price premium on products which serve good purposes. The same applies to voluntary extra charges on the airline tickets. Moreover, people have voted for politicians who introduce environmental taxes. The commitment of firms, however, continues to be a difficult issue for various reasons. First, though the commitment problem is akin to an adverse selection problem faced by the consumers', markets have developed scarce instruments for consumers to discipline firms by any kinds of incentive schemes. Consumers can abstain from buying the products of firms having no ethical code and they can organize boycotts against such firms but that is often most the consumers can do. Second, firms are protected by the principle of limited liability. For example, it remains to be seen whether the equity capital of BP is sufficient to take the full responsibility of the oil scandal in the Mexican Gulf. Third, once consumers have adopted the beliefs that large firms, say, behave according to an ethical code, the monitoring incentive disappears. Fourth, there is a paradox: even when we like to have more ethical behavior and even when consumers are willing to pay a premium on such behavior it tends to be eliminated as free entry attracts more ethical firms driving the premium to zero! [2]

Despite these limitations, one can ask to what extent consumers have the power to influence the choice of the ethical code of firms. This is the issue of our paper. We abstract from firms' strategic interactions. It has been examined by the earlier work (Kanniainen and Piatarila (2006) and Glazer,

[1]Clearly, the world conscience has not been fully awaken. Consumers continue to buy products of the largest polluters in the world, say the USA and China.

[2]One would like to see more entry of ethical firms but to maintain the premium on responsible behavior one should instead restrict the entry!

Kanniainen and Poutvaara (2010)) arguing that incentives for commitment by firms may arise from Prisoners' Dilemma. In the current paper instead, firms are assumed to operate in competitive conditions, they produce non-differentiated products but their image is vulnerable to their investment in a costly ethical code.[3] Firms have an option of choosing between two strategies, i.e. adopting a costly ethical code or not. Consumers with moral preferences monitor firms imperfectly. We do not equip consumers with instruments other than their purchasing power and moral preferences. They are willing to pay a price premium on ethical production. We consider also the case where consumers behavior is affected by other consumers and where firms are affected by their expectations on what the other firms do. The analysis defends the view that high-cost ethical production can survive when consumers are willing to reward. While consumers can reward ethical production, the short run gains will be eliminated by free entry to industries in the longer run.

As the firms' type is private information to firms and is imperfectly revealed to outsiders, we mostly consider equilibria which are not fully separating. In our model, firms which are interpreted as being ethical, do not suffer from suspicion. Those firms who did not invest in an ethical code, thus have an incentive to mimick those who invested in order to benefit from consumers' willingness to pay a price premium. Thus, they do not have an incentive to signal their type. It is the contrary which is the case. Under such strategy, they can become large and exploit cheap labor, say child labor to make it hard for firms with strong ethical principles to enter. The other side of the coin is that the detection probability of large firms tends to be greater than that of small firms.

The paper challenges the claims that large firms have smaller incentives to undertake unethical strategies today than small firms. The literature has found mixed effects on the relation between the size of a firm and corporate social responsibility (CSR), some papers finding that corporate social responsibility (such as limited pollution) increases with firm size, and others finding little effect. In light of our results reported below, that is not surprising. In equilibrium, if consumers value such responsibility, and if large firms have a greater incentive to pursue responsibility, then small firms may profit from mimicking the behavior of large firms—we will observe a pooling equilibrium rather than a separating equilibrium. Moreover, the effect of firm size on CSR will differ when the penalties on bad behavior are imposed

[3]The model thus differs from papers on experience goods and firms' reputation.

by government than when they are imposed by consumers.

Some case studies find that large firms value low pollution beyond levels called for by regulation. Poduska et al. (1992) find that Kodak made a conscious effort to reduce the level of pollution emissions through technological innovations. Stanwick and Stanwick (1998) use a measure of pollution issued by the U.S. Environmental Protection Agency in its Toxic Release Inventory Report; they thus study governmental regulation, finding that pollution by firms declines with sales. Grant, Bergesen, and Jones (2002) find that large chemical plants emit more toxins at a higher rate than do smaller plants but the coefficient on firm size is insignificant. Florida (1996) finds that the adoption of environmental innovations (including source reduction, pollution prevention, and green product designs) increases with firm size. Hamilton (1995) argues that large firms are more sensitive to reputational concerns being more likely to be subject to bad publicity if they pollute. He finds that large firms are more likely to have their emission records covered by the media, and that they experience an average loss of $4.1 million in stock value the day after their emissions are reported in newspapers.Alberini and Austin (2002) find that in states with strict liability, small firms have more pollution releases. One reason may be that faced with liability, smaller firms engage in riskier activities, ceasing operations if faced with high liability.

Consumers throughout the globalized world take today more active positions with regard to the firms' actions.[4] The changed worldwide communication has substantially increased the effective transmission of information.[5] We introduce an evolutionary approach in the sense that we allow for mutant firms to shake the industry equilibrium. We also allow for consumers to adjust their preferences in the light of the social values among groups. We state conditions when a mutant firm with an ethical code can successfully invade the population of firms with no ethical code. Despite abstracting from strategic interactions, firms' investment in an ethical code is assumed to be infleunced by what they think other firms are doing. The expectations effects give rise to multiple equilibria.

[4]Research support the proposition that consumers can influence firms, see Morales (2005). Cronberg (1986) analyzed consumers' effect influence on new technology. Incentives for boycotts have been studied by Klein, Mith and John (2001), (2004). See also Antheon, Camarero and Carrero (2007). The deviating firms may suffer from a boycott by its competitor, cf. Brennan (1992).

[5]Cf. Andresen (1999).

2 Model

Firms with different ethical codes The markets are competitive. Firms produce identical products.[6] Firms may follow two strategies. They have a choice between having an ethical code or not having it. Their production, for example, may lead to emissions. They might not evade the temptation of employing cheap child labor or evade taxes to reduce costs etc. As buyers, people have moral preferences; they prefer to buy at firms which have adopted an ethical code. We make the firms' ethical code non-verifiable and the type of a firm detectable probabilistically. Ultimately, we contrast small, say local firms and large, say multinational firms making their detection probability differ.[7]

Can firms with different ethical codes co-exist in an industry equilibrium? We introduce below an evolutionary argument. We consider first an industry where production causes an externality, say pollution. In the "past" indeed, firms did not pay attention to the externality neither were consumers aware. Subsequently, consumers have awakened and firms have started to control their emissions for image reasons. Consumer awakening is reflected in their preference for a product of a firm with an ethical code (H-firm) over the product of a firm with no ethical code ($L-$firm).

Having an ethical code is costly. If a firm makes such an investment, it pays a sunk cost $\gamma > 0$. There is an entry cost $\alpha > 0$ which in a one-period model represent a fixed cost of production. There is also a variable cost. The cost functions are

$$\gamma + \alpha + \frac{1}{2}\left(y^H\right)^2, \quad \alpha + \frac{1}{2}\left(y^L\right)^2$$

where y^H, y^L denote the firm-level outputs for ethical and non-ethical firms, respectively.

At entry, firms choose their ethical code maximizing their expected profit over their life-cycle (typically one period in our paper).

[6] Products are not experience goods as in the literature on reputation building.

[7] This is because of the Google-effect. Today, Google knows (almost) everything about (almost) everyone!

Consumers' self-respect: moral preferences Consumers buy at most one unit of the good. They are endowed with moral preferences. Consumers' willingness to pay for the product suffers if they realize that they have been buying at a firm with no ethical code. The mass of consumers is 1, they are indexed by c^i with respect to their basic willingness to pay in decreasing order. Consumer c^0 is endowed with the highest willingness to pay, say β_H, for the product; consumer c^1 has zero willingness to pay for it. The willingness to pay by the rest of consumers is uniformly distributed on $(0,1)$. Using our assumption, the consumers can be ordered along a declining demand curve.[8]

The net utility of consumer c^i when buying at a firm thought to have an ethical code[9]

$$u^i = \beta_H(1 - c^i) - p^H,$$

where p_H is the price of an $H-$ firm.

As consumers value the producer's image their willingness to pay is reduced to $\beta_L < \beta_H$ if the firm is caught from, say polluting. The net utility of consumer c^i from buying at a polluting firm is

$$v^i = \beta_L(1 - c^i) - p^L.$$

In a sense, the difference $(\beta_H - \beta_L)(1 - c^i)$ measures the degree of self-respect of the consumer i.[10]

Imperfect signals and the time line The time line of the model is as follows.

1) There is free entry, firms pay an entry cost α but firms' cost is unknown.

2) After entry, firms choose between two strategies, the image building i.e. investing in abatement at cost γ or not investing. The investment cost is firm-specific. Before entry, the magnitude of γ is unknown to the firm but after entry it is revealed to it. (This assumption is needed in one section only). An investment represents a high ethical code and the second one a

[8] We do not of course imply that as humans consumers would be more moral than, say as the shareholders of companies,

[9] These preferences are analogous to those in cf. Katz and Shapiro (1985).

[10] Our approach is a formalization of the sociological theory of self-esteem. We refer to Franks and Marolla (1976) who conceptualize self-esteem in terms of the individual's feelings derived from his own perceptions and appraisals of significant others in the form of social approval.

low ethical code. Firms are labelled as H and L according to their ethical code.

3) Firms decide on their production. Production is polluting.

4) Consumers obtain an imperfect signal of the firms' ethical code. If a firm is caught from polluting, it is classified as L. If the firm is not caught, its type is either H or L. An L firm is detected with probability $q < 1$. Consumers express their willingness to pay a higher price for the product of an H-firm and lower price for the product of an L-firm.

3 Initial industry equilibrium with L-firms only

As the base line case, we consider a competitive market where no firm has an ethical code and the consumers do not value moral aspects. The profit of each firm is

$$\pi^L = p^L y^L - (\alpha + \frac{1}{2}\left(y^L\right)^2).$$

Firms are price-takers and their output is

$$y^L = p^L.$$

Zero-profit condition implies that the industry price will be

$$p^L = \sqrt{2\alpha}.$$

Consumers' demand is

$$v^i = \beta(1 - c^i) - p.$$

In equilibrium, the marginal buyer, c^m, has zero net utility. His "index" gives the size of the consumer market, industry output

$$c^m = 1 - \frac{p_L}{\beta_L} = 1 - \frac{\sqrt{2\alpha}}{\beta_L}.$$

The output of each firm is

$$y^L = \sqrt{2\alpha}.$$

The profit of each firm is naturally zero.

4 Industry equilibrium when both H- and L-firms are in the market

4.1 Both H- and L-firms in the market under imperfect detection

Consider now the case where firms have available two strategies. They can invest γ or abstain from investing. The H-firms invest while the L-firms. The investment is imperfectly observable after firms have produced but not yet sold. Those which have been identified as L are of type L. Among those which have been identified as H, there are some which are of type L. The probability of being caught as L is $q < 1$.[11] We anticipate an industry equilibrium where consumers are segmented intro two groups with net utilities

$$u^i = \beta_H(1 - c^i) - p^H$$

$$v^i = \beta_L(1 - c^i) - p^L$$

where p^H id the price of the product of ethical firms and p^L is the price of product of the non-ethical firms. We anticipate $p^H > p^L$.

Firms' costs are

$$\begin{aligned} H &: \gamma + \alpha + \frac{1}{2}\left(y^H\right)^2 \\ L &: \alpha + \frac{1}{2}\left(y^L\right)^2. \end{aligned}$$

Imitation: Proftis under imperfect detection An H-firm has non-risky profits

$$\pi^H = p^H y^H - (\gamma + \alpha + \frac{1}{2}\left(y^H\right)^2).$$

[11] A more elaborate information confusion structure would allow for two types of classification errors, i.e. that consumers understand that some firms classified as type H truly are of type L.

An L-firm is misclassified as an H type with probability $1-q$. It has risky profits with an expected value

$$E\pi^L = (1-q)p^H y^L + qp^L y^L - (\alpha + \frac{1}{2}\left(y^L\right)^2).$$

As firms are price-takers, the optimal outputs (firms size) are

$$\begin{aligned} y^H &= p^H \\ y^L &= (1-q)p^H + qp^L \end{aligned}$$

It follows from $p^H > p^L$ (see below)

Lemma 1. *Consumers reward ethical production: when the detection probability is positive, an L-firm produces a smaller output than an H-firm.*

We highlight that in the world occupied by homo oeconomicus, no H-firm could possibly survive the competition. In our model with consumers having moral preferences, the H-firms survive, even flourishing to the extent that their optimal size exceeds that of the L-firms.

An L-firms has, however, benefited from that it has not invested γ.From the zero-profit conditions, we obtain the market prices

$$p^H = \sqrt{2(\gamma+\alpha)}$$

and

$$p^L = \sqrt{2}\frac{\sqrt{\alpha} - (1-q)\sqrt{\gamma+\alpha}}{q}.$$

Thus, the price premium on ethical production is

$$p^H - p^L = \frac{\sqrt{2(\gamma+\alpha)} - \sqrt{2\alpha}}{q} > 0.$$

Some other conclusions are at hand. Such a price structure supports an industry equilibrium where both types of firms co-exist. We notice that with zero detection probability, $p^L = \sqrt{2\alpha}$. The greater the detection probability is the greater must be the price charged by detected $L-$firms to break even *ex ante*, $\partial p^L/\partial q > 0$. Moreover, the greater the investment cost for an H-firm is the greater is the price of an H-firm and the lower is the price of an L-firm.

We notice that the firm sizes can be stated as

$$y^H = \sqrt{2(\gamma+\alpha)}$$

$$\begin{aligned} y^L &= (1-q)\sqrt{2(\gamma+\alpha)} + q\frac{\sqrt{2\alpha} - (1-q)\sqrt{2(\gamma+\alpha)}}{q} \\ &= \sqrt{2\alpha}. \end{aligned}$$

Consumer markets There are two equilibrium conditions. Knowing the prices, we solve for the size of the consumer markets. The marginal consumer in the $H-$sector, c^m, has to be indifferent between buying at an H-firm and at an L-firm,

$$\beta_H(1-c^m) - p^H = \beta_L(1-c^m) - p^L.^{12}$$

Solving, for the number of consumers

$$\begin{aligned} c^m &= 1 - \frac{p^H - p^L}{\beta_H - \beta_L} \\ &= 1 - \frac{\sqrt{2(\gamma+\alpha)} - \sqrt{2\alpha}}{q\left(\beta_H - \beta_L\right)}. \end{aligned}$$

The marginal consumer in the L-sector, with an "index" $c^m + c^n$, has to be indifferent between buying at an L-firm and buying none,

$$\beta_L(1 - (c^m + c^n)) - p^L = 0.$$

The total number of consumers in the industry is

$$c^m + c^n.$$

Solving for the active customers in the L-sector,

$$c^n = \frac{\sqrt{2(\gamma+\alpha)} - \sqrt{2\alpha}}{q(\beta_H - \beta_L)} + \frac{(1-q)\sqrt{2(\gamma+\alpha)} - \sqrt{2\alpha}}{q\beta_L}.$$

[12] We note that some of those customers perceived of buying at an H-firm, actually are buying at an L-firm.

When a consumer morality sustains H-firms in industry equilibrium? The interesting question is whether concumer morality can sustain an industry equilibrium where H-firms survive. The answer is imbedded in the results above. In particular, when $q(\beta_H - \beta_L)$ is great relative to γ the H-firms indeed survive and $c^m > 0$.

Lemma 2. *A large consumers' self-esteem effect, $\beta_H - \beta_L$, associated with a great detection probability q of L-firms makes H-firms survive and results in proportion of buyers at H-firms, $c^m/(c^m + c^n)$, being large.*

We notice, however that even when $q(\beta_H - \beta_L)$ is great, say the detection of deviators is perfect, the exit of L-firms is imperfect, i.e.

Lemma 3. *Some L-firms do not exit as long as the the investment cost γ of positive.*

4.2 Limited liability increases unethical behavior[13]

With unlimited liability, a firm which is detected may suffer a loss, negative profit. In conditions of limited liability, its expected ex ante profit is

$$\pi = (1-q)\left[p^H y - \left(\alpha + \frac{1}{2}y^2\right)\right] + q\max[0, p^L y - \alpha - \frac{1}{2}y^2]$$

Limited liability by restricting the downside risk, increases the incentive for the entry of non-ethical firms. Additional entry eliminates the excess profits in the long run as more firms with limited liability enter.

Akerlof and Romer (1993) have suggested that planning for a bankruptcy is profitable under limited liability. To formalize, assume that firms have the choice between a high-risk activity and low risk activity with damage, $D > 0$. The expected returns on a high-risk activity and a low-risk activity are

$$E[\pi_H] = p_H[R_H - \min(0, D)]$$

$$E[\pi_L] = p_L[R_L - \min(0, D)].$$

Clearly, $E[\pi_H] > E[\pi_L]$. Moreover, with limited liability on the damage, firms have no incentive to invest in prevention of the damage.

[13]The case of limited liability and bankrupt right is relevant in the light of, say Enron's moral hazard strategy. The company had hidden its losses in subsidiaries and decleared subsequently bankruptcy.

5 Large firms having greater detection probability than small firms

We have seen above that consumers have a decisive power when it comes to study the market shares of firms with different ethical codes. Given such pressure, one would like to know whether large and small firms behave differently. Intuitively, such a difference may arise as the detection probability of large firms can be thought to be bigger than that of small firms.

Why are some firms large and some small? In our model, firms produce identical products. Above we have seen that firms which invest in the ethical code become large while those who do not invest become small as consumers reward and punish. Recall the optimal sizes

$$y^H = \sqrt{2(\gamma + \alpha)}$$

$$y^L = \sqrt{2\alpha}.$$

Large firms may be large because consumers reward. Large firms may also be large for more conventional reasons. They may have a cost advantage. Suppose therefore that some firms have a cost advantage and that it is the variable cost which differs among firms. Such an heterogeneity may result from differences in the management quality, the motivation of workers etc.

We ask now: in which way do the low-cost firms exploit their cost advantage given that consumers have moral preferences? Do they grow even bigger by attracting more customers? Or do they try to get even more economic benefits in terms of their profits?[14] Consumers do not observe the cost differences, only firms investment and even that imperfectly.[15]

To complicate the question we introduce an additional assumption: the detection probability of a deviating large firm is greater than the detection probability of a deviating small firm, $q = q(y), \quad q' > 0$.

This assumption is motivated by that large firms are much more linked with the society than small firms, i.e. to customers, suppliers, sub-contractors, and workers. Therefore, they are more easily detected. We denote by l the

[14] We notice that we focus on long-term equilibrium where no firm eventually can make a profit.

[15] A firm can claim its its high price depends on its investment though the firm is an inefficient high-cost firm.

low-cost firms and by h the high-cost firms. The cost difference is given by the parameters

$$\theta^l < \theta^h.$$

In principle, we can have four types of firms in the market, low-cost H-types, low-cost L-types, high-cost H-types and high-cost L-types. But there can only two prices. Whta types survive? Whatever its size, the profit of an H-firm is

$$\pi^H = p^H y^H - \left(\gamma + \alpha + \frac{1}{2}\theta^j \left(y^H\right)^2\right), \quad j = l, h.$$

Now the marginal cost is $\theta^j y^H$ and the optimal size of a price-taking firm is given by

$$y^H = \frac{p^H}{\theta^j}.$$

The zero-profit condition for H-firms dictates the required price

$$p^H = \sqrt{2\theta^j (\gamma + \alpha)}.$$

Solving for the optimal firm size,

$$y^H = \sqrt{\frac{2(\gamma + \alpha)}{\theta^j}},$$

a low-cost H firm has an incentive to become large, $\partial y^H / \partial \theta^j < 0$. Moreover, given the required price, $p^H = \sqrt{2\theta^j (\gamma + \alpha)}$, only low-cost H-firms can survive. High-cost H-firms have no change. However, they have the option of not investing and mimicking H-firms.

To obtain sharp results, we make an extreme assumption: large defecting firms are captured with probability q = 1 but small defecting firms are captured with probability q = 0.

The zero profit condition for high-cost L-firms then is

$$p^H y^L - (\alpha + \frac{1}{2}\theta^h \left(y^L\right)^2) = 0.$$

Their optimal size is

$$y^L = \frac{p^H}{\theta^h}.$$

Because of the cost disadvatnage, they are smaller than the low-cost firms. The price they obtain is however, the price in the H-sector,

$$p^H = \sqrt{2\theta^l(\gamma+\alpha)}.$$

Are they breaking even at this price? The condition is

$$p^H y^L - (\alpha + \frac{1}{2}\theta^h \left(y^L\right)^2 \geq 0.$$

Because their size is $y^L = \frac{p^H}{\theta^j}$,the break-even condition is

$$p^H \frac{p^H}{\theta^j} - (\alpha + \frac{1}{2}\theta^j \left(\frac{p^H}{\theta^j}\right)^2 \geq 0,$$

or

$$p^H \geq \sqrt{2\theta^h \alpha}.$$

In other words,

$$\sqrt{2\theta^l(\gamma+\alpha)} \geq \sqrt{2\theta^h\alpha}.$$

This amounts to

$$\theta^l(\gamma+\alpha) \geq \theta^h\alpha.$$

Intuitively, the cost disadvantage has to be compensated by the saving in the investment cost.

Potential entry of low-cost firms into the L-sector does not destroy the survival chance of high-cost firms as long as the low-cost firms are big enough and the subject of detection. Their optimal size in the L-sector is

$$y^H = \frac{p^L}{\theta^l}.$$

The condition

$$y^H = \frac{p^L}{\theta^l} > y^L = \frac{p^H}{\theta^h}$$

amounts to requirement

$$\frac{\alpha}{(\theta^l)^2} > \frac{\gamma+\alpha}{(\theta^h)^2}.$$

Intuitively, the cost advantage has to be great enough to maintain the size difference of firms. We report,

Proposition 1. *Under cost (and hence size differences), and the large firms being the subject of monitoring by customers, the production sector becomes segmented. Low-cost large firms serve the customers who value ethical production. Small high-cost firms do not invest in the ethical code but can exist when the cost disadvantage is compensated by the saving in the investment cost.*

5.1 When low cost reflects unethical production: child labor

It is also possible that low production cost and large firm size result from unethical cost savings, like the use of child labor which is cheaper than adult labor, tax evasion and grey market transactions etc. In this case, large firm size is not a signal of efficiency but missing business ethics. This case will not be analyzed in detail here.

6 How to reach the industry equilibrium: an evolutionary view

6.1 An H-mutant enters

To develope an argument for how to arrive at the industry equilibrium, we develop an evolutionary mechanism. Assume that the industry is initially occupied by the firms of L-type. We ask whether an $H-$mutant has a chance of invading successfully the industry. (We first abstract from imperfect detection. Imperfect detection does not make sense here?) We assume that some customers' latent moral preferences have become awaken as to the environmental damages. With the entry of a mutant, they have the possibility to reveal their preference.

The existing industry faces the lower demand function. From Section 4, the industry price is $\sqrt{2\alpha}$ and the profit of each firms $\pi^L = 0$. Whatever the history of the industry, the H-mutant faces a greater willingness to pay β_H. It is not, however, profitable to enter with, say a "small" capacity as it has to cover both its entry cost and the investment cost. However, it can operate

as a H-monopolist serving those customers with high willingness to pay. The profit of the invading firm therefore is

$$\pi^H = p^H y^H - (\gamma + \alpha + \frac{1}{2}\left(y^H\right)^2).$$

It serves customers on the demand function

$$u^i = \beta_H(1 - c^i) - p^H$$

Its optimal output therefore is

$$y^H = \frac{\beta_H}{1 + 2\beta_H}$$

and profits

$$\pi^H = \beta_H^2 \frac{1 + \beta_H}{(1 + 2\beta_H)^2}(\frac{1}{2} + \beta_H) - (\gamma + \alpha).$$

Then, condition

$$(\gamma + \alpha) \leq \beta_H^2 \frac{1 + \beta_H}{(1 + 2\beta_H)^2}(\frac{1}{2} + \beta_H)$$

is necessary and sufficient for a successful entry by an invading firm of type H.

7 Consumer herd effects

People care for what other people think of them. This mechanism is missing from the textbook consumer theories. The economic decisions of an individual, however, zre often affected by the choices made by other people. The economic herd theory explains why people sometimes disregard their private information and join a herd. People also are affected by the status effect i.e. what they think that other people think of them.[16] We develop the status argument here. We suggest that when a consumer is affected by other people's

[16]The analysis of Glazer, Kanniainen and Poutvaara (2010) is based on such a status effect.

judgements this has an impact on the other side of the market, producers' choice of their ethical code.

To fix the idea, consider again a world where no consumer rewards a firm's ethical code and therefore no firm invests in it. Preferences are given by the demand function

$$v = \beta_L(1 - c) - p$$

and profits

$$\pi = py - (\alpha + \frac{1}{2}y^2).$$

The market price is

$$p = \sqrt{2\alpha}$$

and the size of the consumer market is

$$c^m = 1 - \frac{\sqrt{2\alpha}}{\beta_L}.$$

Consumers, however, have latent moral preferences. Introduce a mutant firm which does not pollute but which bears therefore an extra cost $\gamma > 0$. If it is able to sell its output at a sufficient price, it may survive. Write its profit as

$$\pi^H = p^H y^H - \left(\gamma + \alpha + \frac{1}{2}\left(y^H\right)^2\right).$$

A necessary condition for a successful invasion is that the latent preferences of y^H consumers get revealed and make $\pi^H \geq 0$.

The status effect and the adaptation of preferences can be introduced by making the willingness to pay depend on the number of other consumers buying at an H-firm

$$\beta_H = \beta_H(c^m), \quad \beta_H(0) = \beta_L, \ \beta'_H > 0.$$

A given price structure is determined by the existing willingness to pay. The adjustment of preferences now rotates the demand function for the product of H-firms up. In each step, there will be more production by H-firms and the market prices adjust. The dynamics is given by two differential equations

$$\frac{dc^m}{dt} = k_1 \left\{ \beta_H(c^m)(1-c^m) - p^H - \left[\beta_L(1-(c^m+c^n)) - p^L \right] \right\}, \quad k_1 > 0$$

$$\frac{dc^n}{dt} = k_2 \left\{ \beta_L(1-(c^m+c^n)) - p^L \right\}, \quad k_2 > 0$$

We have not imposed restrictions on the second derivative, $\beta''_H < 0$ or $\beta''_H > 0$.Conditions for a stationary state, say (c^{m*}, c^{n*}) with both H- and L-firms, can be given in terms of the Routh-Hurwitz theorem. Using the linearised dynamic system around that state,

$$\begin{bmatrix} \frac{dc^m}{dt} \\ \frac{dc^n}{dt} \end{bmatrix} = \left[A \begin{bmatrix} c^m - c^{m*} \\ c^n - c^{n*} \end{bmatrix} \right],$$

the conditions

$$trace(A) < 0, \det(A) > 0.$$

are necessary and sufficient for the chacteristic polunomial to have negative real roots implying asymptotic stability. The dynamics operates like a meme effect among consumers.

8 Expectations and multiple equilibria

8.1 Responsible business arises from the misconception of firms

It is clear that actions are motivated by beliefs and that the economic outcomes are influenced by the beliefs of the decision-makers. We examine in this section an industry equilibrium when firms' beliefs of the types of other firms are relevant. Given the information beliefs of firms, their decision has to maximize their expected profit. The investment cost γ is firm-specific and firms enter without knowing their cost. Upon deciding their decision on their ethical status, they judge their cost in the light of their expectations as to the distribution of the costs of the other firms. The distribution cannot be imposed. We consider two cases to highlight the possibility of multiplicity of the industry equilibrium.

(i) Each firm has a low γ and assumes that for other firms it is high Suppose that a firm presumes that it has a low γ and assumes that for other firms it is high. The firm thus expects an industry equilibrium presented in Section 4 with a small size of the consumer market,

$$c^m = 1 - \frac{p_L}{\beta_L} = 1 - \frac{\sqrt{2\alpha}}{\beta_L.}.$$

However, if all firms share this expectation, they all have an incentive to become H,a profitable mutant. A responsible business then arises from the misconception among firms,

Proposition 2: *When firms do not know the investment cost of other firms but expect that it itself is a low-cost firm and that the othes are high-cost firms, the whole industry investment and in equilibrium all firms are of type H (in the first period). The equilibrium repeats over two periods.*

(ii) Each firm has a high γ and assumes that for other firms it is low Suppose instead that a firm presumes that it has a high γ and assumes that for other firms it is low. The firm thus expects an industry equilibrium with a larger consumer market,

$$c^m = 1 - \frac{p_H}{\beta H} = 1 - \frac{\sqrt{2\alpha}}{\beta_H.}.$$

However, if all firms share this expectation, none of them has an incentive to become H,a profitable mutant. A responsible business cannot arise because of from the misconception among firms.

Proposition 3: *When firms do not know the investment cost of other firms but expect that it itself is a high-cost firm and that the others are low-cost firms, no firm in the industry invests and in equilibrium all firms are of type L (in the first period). The equilibrium repeats over two periods.*

9 Final remarks

Empirically, unethical behavior does not increase with the size of the firm. This paper advances theoretical work be exploring, among other themes, the connection between firm size and Corporate Social Responsibility (CSR).

Larger firms receive a high level of attention from the general public, which may encourage them to show higher CSR. But that cannot be the whole story. First, if consumers value CSR, then small firms may want to mimic them. Second, firms with low CSR may enjoy lower marginal costs of production, which induces them to increase output. Third, the standard story does not explicitly explain why some firms are small and others are large, or why firms with a given size vary in their CSR. Fourth, empirical studies suffer from the problem of observation—the level of CSR may be the same for firms of different sizes, but the researcher may observe more instances of bad CSR among large firms.

Judging our answers, they depend on what we think of human beings. In the world which is occupied by homo oeconomicus there is no role for business ethics. The economists' typical view of humans as homo oeconomicus has been challenged on several grounds over the past decades. In the modern theory of social norms, reciprocity, and other areas of positive ethics, based on biology, evolutionary psychology and archeology, human are viewed to some extent at least as homo moralists. The research which combines those various studies has indeed provided steps towards a better understanding of ethical behavior. The psychology which was developing among the hunter-gatherers is still among us and in transmitted through generations in the genes and hormones of humans. This is to say, it makes sense for economists to study humans in terms of their moral preferences.

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