ANGER AND REGULATION

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Abstract

We study a model where agents experience anger when they see a firm that has displayed insufficient concern for their clients' welfare (altruism) makes high profits. Regulation can increase welfare, for example, through fines (even with no changes in prices). Besides the standard channel (efficiency), regulation affects welfare through 2 channels: (i) regulation calms down existing consumers because a reduction in the profits of an "unkind" firm increases total welfare by reducing consumer anger; and (ii) individuals who were out of the market when they were angry in the unregulated market, decide to purchase once the firm is regulated.

Keywords: Public relations, commercial legitimacy, populism.

JEL Classification Numbers: D64, L4

I Introduction

Governments routinely regulate markets, particularly those where there is a tendency towards little competition. One possible explanation is that such regulation improves efficiency. Indeed, economists have developed normative theories of regulation, explaining how social welfare increases when such regulation adopts a particular form. For example, forcing a monopoly to increase output might be desirable because, in a monopoly equilibrium, the cost to the firm of an extra unit is less than the value given to it by the consumer (see, Pigou, 1938, Baron and Myerson, 1982, Laffont and Tirole, 1991, *inter alia*).

In many settings, however, efficiency is not the only -nor the most important- human motivation. In ultimatum games, for example, consumers are often willing to walk away from a profitable deal that they feel takes advantage of them. Thus, an important challenge is to develop a normative theory of regulation that incorporates a more complete description of human motivation.[1] Although most existing models do not focus on such emotions and the "populist dynamics" to which they often give rise to, they are central in our paper as we emphasize the role of emotions in the motivation of consumers (as distinct from a material motive). Thus, we assume that a consumer's experience and decisions can be understood by studying total utility, constructed as the sum of a material payoff and an emotional payoff. Psychologists and some economists have gathered evidence on several emotions that are candidates to be part of the second term. One that appears to be particularly relevant for the setting we seek to describe, whereby a monopoly might "abuse" its market position and set "exploitation" prices, is consumer anger.

Anger appears to have been central in several historic episodes whereby some form of regulation or punishment of business was put into place, although economists typically dismiss them as populist incidents, perhaps because they often involve indignation at actions that may be broader than price increases. Di Tella and MacCulloch (2009) show empirically

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[1] Actual regulation often mentions fairness. For example, article 82 on competition policy in the European Community treaty prohibits abuse by "directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions". Several authors have argued economics has difficulties in providing a comprehensive theory of regulation (descriptive or normative). See, for example, Zajac (1995), who discusses alternative definitions of fairness applied to regulation, including how the tension between fairness and efficiency has shaped public policy in several areas (beyond the regulation of public utilities), as well as Posner (2002), who focuses on the difficulties in defining the concept of transaction cost.

that a measure of "average anger" in society rises when businessmen are perceived to be corrupt, but that such angry reaction falls when there is heavy regulation of business. The purpose of our paper is to develop a model where we can understand the causes of these populist forces and how regulation might help contain them. Evidence gathered by psychologists points out to several characteristics of angry emotional reactions. For example, anger is correlated with the belief that redress is still possible; that remedy requires (perhaps indirectly) the intervention of the self; and that others -as opposed to the situation, or the self- were responsible for the negative event (see, for example, Smith and Ellsworth, 1985, Lazarus, 1991, and Lerner and Tiedens, 2006). Small and Lerner (2005) found that individuals induced to feel anger choose to provide less welfare assistance than those induced to feel other emotions, while Bodenhausen *et al.* (1994) found them to engage in more stereotyping. Less of this research has concerned itself with emotional reactions following price increases, although Tyran and Engelmann (2005) were able to generate experimental evidence on boycotts following increases in prices in the lab.

We study a model where an individual's experience as a client of a monopolistic firm improves when the price paid falls and the profits of those firms perceived as unkind go down.[2] The first of these two terms –the material payoff- is standard in economics, while the second term –the emotional payoff- captures the demand for fairness that has been analyzed in several well-known models in economics such as Rabin (1993), Fehr and Schmidt (1999), Falk and Fischbacher (2006), *inter alia.*[3] In particular, we follow Levine (1998) and Rotemberg (2008) and assume an individual's kindness towards others depends on their estimation of how kind others have been in relationships with them.[4] This allows these authors to have

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[2] Anecdotal evidence suggests that anger often arises at the announcements of high profits by firms that are under scrutiny. See, for example, "Railtrack profits spark anger", reported on *BBCNew*s online, Thursday, November 4, 1999. http://news.bbc.co.uk/2/hi/business/504329.stm. Accessed Tuesday October 28th, 2008.

[3] Jolls, Sunstein and Thaler (1998) provide an early discussion of how law and economics might incorporate agents that have bounded rationality and bounded self-interest. See also the contributions in Sunstein (2000) as well as the observations in Posner (1998).

[4] Although there are differences (Levine's preferences are linear) in our context they lead to similar implications. One reason is that, although in Rotemberg the individual is angry or not, whereas in Levine "anger" is continuous, the tradeoffs in Levine are linear, so the optimal amounts of regulation (or of punishment) are corner solutions: the individual wants either no punishment or as large a punishment as possible. Rotemberg (2008) explains how the "minimal altruism" preference relations he defines explain a wide range of behavior in ultimatum and dictator games.

agents who are "spiteful" towards those that are perceived to have behaved unkindly to the decision maker, a feature that plays a key role in our theory of regulation of monopolists. Note that this specification naturally leads to a signaling game, since an individual's action can reveal how altruistic he/she is. Thus, it does not require that there be a large fraction of truly altruistic firms for the equilibrium to be heavily influenced by altruism. Finally, part of the attraction in applying these preferences to the demand for regulation is that it may help explain both the amount of regulation, as well as some instances of redistributive regulation (such as when fines are applied by "populist" governments) and of "inefficient" regulation (i.e. types of regulation may not be optimal from a standard economic efficiency perspective).[5]

We develop a model of price competition along the lines of Salop (1979), but where consumers react with anger when they conclude that the firm has shown low levels of altruism towards them. Given the strength of consumer reactions to high prices by monopolistic competitors, there is a signaling game where it often pays for firms to act as if they were kind. This leads to a set of pooling equilibria, where prices are relatively low and consumers are not angry. One could question whether there is any reason for including anger in a model. After all, one may think that the "anger" reported above at price increases is just the reflection of a lower utility achieved at the new price level. Moreover, the evidence gathered by psychologists on anger cited above does not really focus on price changes and somewhat abstract entities such as firms. A recent paper, however, presents convincing evidence on this issue. Anderson and Simester (2010) use two large field experiments to study how customers react if they buy a product and later observe the same retailer selling

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[5]Another instance where anger may be the driver of regulation is the rise of political pressure on CEO pay following the 2008-9 financial crisis. A report in the *Financial Times* explains "Gordon Brown, the prime minister, has said he would use the government's banking aid package to clamp down on compensation, adding 'the days of big bonuses are over'". And then describes how the actions of the Financial Services Authority reflected this heightened pressure. For example it states "The letter does not have the status of mandatory guidance, but the FSA has said it would increase the regulatory capital requirements for banks that do not sufficiently link pay with risk." See *Financial Times*, Monday October 13, 2008. With respect to the forms of regulation, we note that previous work has tried to explain variations over time. For example, the growth in the size of the market plays a key role in the explanations for why private litigation is substituted by ex-ante regulation during the progressive era in Glaeser and Shleifer (2003). Previous work has also tried to clarify why the particular forms observed differ from what economists would expect: Rotemberg (2003) is able to explain the choice of commercial policy (tariff vs quotas) using altruistic preferences.

it for less. They find that customers react by making fewer subsequent purchases from the firm, an effect that is particularly large for the firm's most valuable customers: those whose prior purchases were most recent and at the highest prices. Although it is not hard to produce a model in which a standard utility and some asymmetric information story could predict such a response by consumers, it seems more natural to include what we know about the psychology of consumers into the decision making aspect of the model, as we do.

The main result of the paper is that when competition decreases and the number of firms falls, the set of prices for which a pooling equilibrium can be sustained is smaller. That is, as competition decreases, consumers are more likely to experience anger leading to higher welfare losses. In this context, regulation might increase welfare through three different channels. First, there is the standard channel whereby a reduction in monopoly price leads to the production of units that cost less than their value to consumers. Second, regulation calms down existing consumers: a reduction in the profits of a firm viewed as excessively selfish increases total welfare by reducing consumer anger. Finally, there is a third (mixed) channel arising because individuals who were out of the market when they were excessively angry in the unregulated market, decide to purchase once the firm is regulated, reducing the standard distortions described in the first channel. Note that one of the most visible ways that regulation affects firm profits is by regulating prices, but the mechanism also allows fines (when their imposition is credible) to play a similar role. Our theory connects the public's appreciation of firms with the extent of competition, noting that positive appraisals of big monopolies would be harder to maintain. This connection is emphasized in the literature on the history of public relations of large American corporations (see, for example, Marchand, 1998).

Closest to our paper are two studies of the determination of prices when consumers' utility functions display psychologically realistic features. The first is by Heidhues and Kőszegi (2008), who study the role of competition when consumers are loss averse and discuss the emergence of focal points and price rigidity. The second study is by Rotemberg (2005), who assumes a similar set of preferences as we do (consumers get angry when firm's display insufficient levels of altruism), developing a new model with price rigidity and applies it to the analysis of monetary policy. Our model, which extends their analysis of realistic preferences to the context of regulation, is related to theories of exploitation by big firms. Marxist theories emphasize how capitalist institutions (including private ownership of the means of

production and an accomplice State) lead workers/consumers to pay "surplus value" (see Brewer, 1987, *inter alia*). In our theory, consumers have a simple approach to deciding when such exploitation takes place (they measure firm altruism), and are neither alienated nor passive (they get angry). The problem with monopoly in our model is that consumers cannot go to other firms when these misbehave, and because of this, firms are more likely to do so.

Interestingly, our approach to regulation and emotions is connected to capture theory. The Chicago and Virginia schools argue that regulations are the product of interest group activity (see, for example, Stigler, 1971, Peltzman, 1976, Buchanan, 1968, Djankov *et al.*, 2002, *inter alia*). The basic idea is that regulations are correlated with profits across industries and that this could reflect the interaction of groups in society, with different costs and benefits of organizing to obtain favorable regulations. Indeed, noting that "the Civil Aeronautics Board has not allowed a single new trunk line to be launched since it was created in 1938" and other examples where the regulatory actions appear to benefit firms, Stigler (1971) concludes that the most plausible explanation is the firm's demand for protection and regulation. Such demand for regulation on the part of firms and other interest groups has occupied most positive theories of regulation.[6] Whereas the public could in principle be treated as an interest group, as in the generalizations of the theory (see, for example, Becker, 1983, Baron, 1994, Grossman and Helpman, 1994, *inter alia*), the emphasis there is on material payoffs and the public typically ends up with a low influence on the final outcome given the tendency for free riding in voting in models with agents that only care about material payoffs.[7]

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[6]Given the empirical failure of standard (normative) models of regulation, capture theory developed models where the *objectives* of the agencies that implement regulation have been changed (there is, to some extent, democratic failure). We take a different approach and study normative models with non standard preferences (of course, it is possible to develop positive models with both non-standard preferences and agencies that do not seek to maximize the public's welfare). Note that, given the empirical failure of classic normative models of regulations, it is less clear that a model with behavioral features provides less scientific discipline than a model where the agencies are assumed to be captured period after period. An interesting discussion on the exaggeration of democratic failure in regulatory theories appears in Wittman (1989). For a model where public-spirited bureaucrats and public accountability are not enough to induce efficiency, see Leaver (2009).

[7]Rotemberg (2006) shows how altruistic preferences are helpful in explaining turnout by voters who expect to be pivotal with very low probability. Note that Stigler himself refers to the public's demand

In Section II, we introduce the basic model, while in Section III we characterize the equilibrium in oligopoly. The main result is derived, showing that the set of pooling prices is smaller when there are fewer firms, so that anger is more likely as competition decreases. In Section IV we study the welfare gains from regulation. Given that regulation has often been discussed in situations of monopoly, we analyze the monopoly equilibrium and describe 3 channels through which regulation might increase consumer welfare. Section V concludes.

II   The model

We only depart from the standard Salop model by assuming that consumers have a reciprocity component in their utility function: they get angry at firms that they consider to be selfish. In order to do that, we must also incorporate into the Salop model two types of firms, selfish (the standard firms in the Salop model) and altruistic firms who care about the welfare of the consumer.

There are n consumers, each characterized by a parameter x interpreted, as in Salop (1979), as either a "preferred variety" or as a "location parameter". For each consumer, his location is drawn from a uniform distribution on the circle of circumference 1. There are $\frac{1}{b}$ evenly distributed firms along the circle; b is a measure of concentration in the industry.

Firms are of one of two types, altruistic or selfish; the prior probability that a firm is altruistic is q. Firm i chooses a price p_i, and has a cost c, so when demand for its product is D_i, its profits are $(p_i - c) D_i$. If the firm is selfish, that is the firm's objective (its utility). If the firm is altruistic, its utility is profits plus a term that depends on the utility of the consumer. The altruistic firm has a cost of α if consumer utility is lower than a certain threshold τ. In order to keep things tractable, we set τ to be the utility a consumer would get in a Salop equilibrium in a market with $\frac{1}{b} + r$ firms; but this parameter τ could be any other quantity (could come from adaptation, learning, etc.). We interpret the parameter r as a measure of how *r*estrictive our assumption that firms are altruistic is. For $r = 0$, our assumption

for regulation, but it seems that he believed it could not be modeled. When explaining the existence of regulations that harm social welfare, he states "the second view is that the political process defies rational explanation: "politics" is an imponderable, a constantly and unpredictably shifting mixture of forces of the most diverse nature, comprehending acts of great moral virtue (the emancipation of slaves) and of the most vulgar venality (the congressman feathering his own nest)". Our theory of regulation focuses on fairness (and anger) and thus is capable of explaining the type of regulatory phenomena Stigler is concerned about.

has no bite because in a market with $\frac{1}{b}$ firms, in a Salop model, consumers obtain a certain equilibrium utility, and suppose we call this utility τ. Since consumers already attain this equilibrium utility, altruistic firms behave like selfish firms, and the introduction of altruism and reciprocity play no role. For large r, altruistic firms bare the utility cost α for a large set of prices, because the target utility τ is large. In an earlier version of the paper we considered τ to be exogenous, and the same qualitative results obtained.

Each consumer wants to buy (at most) one unit of the good, for which he obtains a gross surplus of s (gross of price and transport costs). If he has to travel a distance x, and pay a price of p_i, the net surplus is $s - tx - p_i$ (i.e. there is a transport cost of t per unit of distance traveled). In addition the consumer derives $\lambda_c(\widehat{\lambda}_f)(\pi + p - c)$ from consuming, where p is the price he is paying to the firm, c is the firm's marginal cost, and π is the profit the firm obtains from other customers. The individual's reciprocity is denoted λ_c, which is assumed to depend on its estimate of the firm's altruism, $\widehat{\lambda}_f$. The individual's reciprocity is assumed to be non-negative when he thinks he is interacting with a "kind" firm, which is a firm that is altruistic towards consumers (i.e., experiences an increase in utility when its customers are happier). And it is assumed to be negative when consumers conclude that the firm they are dealing with is "unkind" –not altruistic. In what follows, $\lambda_c(\widehat{\lambda}_f)$ will be either a fixed number $-\lambda < 0$ or 0, depending on whether the consumer has rejected that the firm is altruistic, or not.

We normalize $t = 1$ (so all other parameters are just normalized by t) and assume that the number of consumers is $n = 1$; both assumptions are without loss of generality. Also, we suppose: $s \leq c + 1$, which ensures that in a monopoly not all consumers are served; and $s \geq c + \frac{3}{4}$, which ensures that in an oligopoly, the market is covered (since otherwise an oligopoly behaves just like a group of local monopolies). We assume that the proportion of altruistic firms in the market is such that based solely on his prior, the individual does not reject that the firm he is facing is altruistic. That is, if the individual is faced with a random firm, and has no information on which to update his prior, he doesn't get angry at the firm.

Finally, we assume that $\sqrt{\alpha} > \frac{5b}{4}\frac{br}{br+1}$. For fixed α, this says that r is not too large (meaning to say that the target level of utility τ is not too restrictive); for fixed r, it says that the utility cost of the firm can't be too small. Notice that the assumption is automatically satisfied if there is competition (small b).

Discussion of the Modelling Assumptions

A standard criticism of preferences that incorporate psychologically realistic features is that they are, in some unspecified sense, ad hoc. We note that the preferences we use are not new as they are exactly those described in Levine (1998) and Rotemberg (2008), whose functional forms yield identical predictions in this context: the discontinuities in choice observed when Rotemberg's agents reject the hypothesis that they face an agent that is not "minimally altruistic" can also be observed when preferences are linear (as in Levine's model) because agents choose corner solutions.[8] More importantly, the authors argue that the preferences they postulate can explain *better than competing theories or functional forms*, the experimental results of ultimatum and dictator games; we refer the reader to their discussion of the evidence. This is important, as these experiments are one of the main reasons why economists have incorporated reciprocity and altruism in utility functions. Therefore, if we want to study the role of reciprocity and altruism, it seems reasonable to request that we choose preferences that can account for the observed experimental data.

The key feature of these preferences, for our purposes, is that a) consumers can get angry, b) that this anger is triggered by the behavior of the firm, and c) that angry consumers dislike firms making a profit (and a consumer is angrier when he contributes to those profits). Four features of these preferences can be emphasized. First, although both departures (for firms and consumers) from standard preferences take specific functional forms, the reader should bare in mind that extensions of the Salop model have been rare, and that one can not obtain closed form solutions if general utility functions are postulated. Second, regarding the preferences of the consumer, they have been contrasted with laboratory data, and they perform better than competing alternatives; moreover, Levine's and Rotemberg's preferences have similar consequences in our model, and that constitutes a robustness check for our specification. Third, regarding the preferences of the firm (a discrete utility loss for the altruistic firm if consumers don't achieve a certain utility level), we considered an alternative specification in which the utility loss of the firm is linear in consumer utility and the same qualitative results emerged (albeit in a more cumbersome manner). Finally, one could take issue with the existence of altruistic firms; we stress that the proportion of altruistic firms plays no role in separating equilibria generally, and even a small proportion of such firms

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[8]We note that this formulation, as Rotemberg's, is not consistent with expected utility, as $\lambda_c(\cdot)$ is a non-linear function of the probabilities (see Gilboa and Schmeidler (1989) for another deviation from expected utility with non-linearities, and Dubra et al. (2004) for a departure due to incompleteness).

has an effect on the emergence of pooling equilibria. As evidence of this effect, Roe and Wu (2009) show that selfish players mimic the actions of altruistic players in a finitely repeated labor market setting with unenforceable worker effort. Reputation appears important: selfish and altruistic types act differently when previous individual actions cannot be tracked (see also Page, Putterman and Unel, 2005 and Fischbcher and Gachter, 2006).

A second aspect of our formulation is that we assume that there is a finite number of consumers who care about the total profits of the firm. Suppose instead we had assumed, as in the standard formulation, a continuum of consumers. In this case, the consumer's purchases would *not* affect the firms profits, and consumer anger would play no role whatsoever in the model. Here we are bound by the preferences of Rotemberg and Levine, who postulate that the reciprocity component of the consumer's utility depends on the total resources of the other party, and *not* on how much the consumer contributes to those resources. An alternative interpretation of the model in this paper is that there is a continuum of individuals, and that when they are angry, they have a cost of purchasing from the firm, regardless of their effect on the firm's profits. That is, our model is identical to one in which there is a continuum of individuals, and their utility is such that if they purchase from a selfish firm, their utility decreases by $\lambda (p - c)$, regardless of whether that affects the firm's profits.

Finally, a comment about the size of λ is in order. The size of λ does not need to change when the size of the firms changes (does not need to change with the application of the model to different situations). To illustrate why that may (incorrectly) seem to be the case, notice that because the size of $\lambda (\pi + p - c)$ increases in π, it would seem that consumers would be willing to punish more a large firm than a small firm (or that for different applications the size of λ would have to change to "match" the real behavior of consumers). That is not the case, because when comparing the utility of buying from one selfish firm or from an alternative firm, even if the consumer buys from the alternative firm, he will still be angry at the selfish firm it is not purchasing from.[9] For concreteness, suppose that the selfish firm is at a distance x, charges a price p, and has profits (arising from other consumers) of π, and

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[9]For simplicity, we only allow firms to signal their type through their choice of prices. But one interpretation of the large amounts of money spent in "public relations" is that they are an attempt to signal a "kind" type by other (presumably cheaper) means than lowering prices. See, for example, Boyd (2000), Metzler (2001) and the discussion in Patel *et al.* (2005). A particular form of public relations that is consistent with our approach is to try to "humanize corporations".

suppose that the alternative firm is located at a distance $b - x$, and charges a price p^a. The consumer will buy from the alternative firm if

$$s - p - x - \lambda(\pi + p - c) \leq s - p^a - (b - x) - \lambda\pi \Leftrightarrow s - p - x - \lambda(p - c) \leq s - p^a - (b - x)$$

so in the purchasing decision, the profits π vanish from the comparison. This last equation also highlights the equivalence between our model and the one with a continuum of consumers, in which a consumer is angry at a firm if and only if he purchases from the firm (if he doesn't buy, he is not angry).

Equilibrium

We will analyze a signaling game, in which firms choose a price which signals their type. An equilibrium in this setting is a triplet $[a(p, x; \mu), p(\theta); \mu(p)]$ where:

- $a(\cdot)$ is an "acquisition" decision strategy (the same for all consumers; we are looking at symmetric equilibria) as a function of price, tastes x (or distance) and beliefs μ (of whether the firm is altruistic or not) into $\{0, 1\}$, where $a = 1$ means "buy" and $a = 0$ means "don't buy";

- $p(\cdot)$ is a function that maps types into prices (one price for each type; the same function for all firms);

- $\mu(\cdot)$ is a function that maps prices into $[0, 1]$, such that $\mu(p)$ is a number that represents the probability that the consumer assigns to the firm being altruistic.

- a is optimal given x, p and μ; p is optimal given a (and other firms playing p); μ is consistent (it is derived from Bayes' rule whenever possible).

We focus on equilibria (pooling or separating) where beliefs are of the sort *"I reject the firm is altruistic if and only if its price p is such that $p > \overline{p}$"* where $\overline{p}$ is the equilibrium pooling price, or the equilibrium price of the altruistic firm in a separating equilibrium (that is, $\overline{p} = p(\theta_a)$ for θ_a the altruistic type).[10]

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[10]We are ruling out (for example) equilibria in which the consumer rejects that the firm is altruistic if the firm charges a price $p < \overline{p}$ (i.e. the consumer comes to believe the firm is selfish even if it is charging a price below the "target" price); in standard signalling models, beliefs like these may still be part of an equilibrium, because in equilibrium one does not observe prices $p < \overline{p}$ and so the consistency condition (that beliefs be derived from Bayes rule) places no constraints on beliefs.

Equilibrium Selection

We will be agnostic as to what equilibrium will be selected. We will discuss mainly pooling equilibria in the case of oligopoly, and separating in the case of monopoly, but that is not because we believe those are the natural things to happen. Rather, it is because we have the following narrative in mind. In a certain industry, before the rise of regulation, there was no anger at firms. Then, at some point the industry became monopolized, anger arose, and with it came regulation.

The way to interpret that chain of events in the context of this model is the following. If there was no anger, and then it appeared, it must mean that firms were pooling before the rise of anger, and that in the monopolized setting the equilibrium was a separating one. Hence our informal equilibrium selection. Some of our results below indicate that this story is plausible, as the set of pooling equilibrium prices decreases with concentration.

III   Anger and Competition in Oligopoly

The following Theorem presents the characterization of pooling equilibria in an oligopoly.

Theorem 1 *A price p^o is part of a pooling equilibrium in an oligopoly with $1/b$ firms if and only if*

$$\frac{1}{4}\frac{4-br}{br+1} \geq \frac{p^o-c}{b} \geq 1 + 2\lambda - 2\sqrt{\lambda(1+\lambda)}. \tag{1}$$

In a pooling equilibrium, consumers always attain their target level of utility, τ.

Proof. All proofs are in the appendix. ∎

We obtain as a corollary the standard Salop equilibrium, when $r = \lambda = 0$.

Multiplying equation (1) by b, we obtain that the admissible set of equilibrium margins, $p^o - c$, is given by

$$\frac{b}{4}\frac{4-br}{br+1} \geq p^o - c \geq b\left(1 + 2\lambda - 2\sqrt{\lambda(1+\lambda)}\right). \tag{2}$$

The expression on the right, is a line with slope less than 1. The expression on the left is concave, with slope 1 at $b = 0$, and is increasing in b, so long as $br < \sqrt{5} - 1$. For reasonable values of b and r, this constraint is not binding (so that the expression on the left is increasing in b). This is so, because for the largest value of b (when the constraint is tighter), which is

$b = \frac{1}{2}$, we obtain $r < 2\left(\sqrt{5} - 1\right) = 2.4721$. That is, so long as we choose $r \leq 2$ the expression on the left will not be binding; $r \leq 2$ means that when the firm calculates the target value of utility τ, it doesn't use as a benchmark an industry that is "a lot" more competitive than the current one; the comparison is with the utility in an industry with $\frac{1}{b} + r$ firms.

As a consequence, we have the following important result: as competition decreases (enough), the set of prices for which there is a pooling equilibrium shrinks. But since pooling equilibria have no anger, and separating equilibria do (in expected terms there will be some selfish firms), when pooling equilibria disappear, anger appears.

Proposition 1 *Suppose br and λ are such that $\frac{4-b^2r^2-2br}{4(br+1)^2} < 1+2\lambda-2\sqrt{\lambda\left(1+\lambda\right)}$. There exists a critical b^c such that if $b \geq b^c$ any decrease in competition (any increase in concentration from b to $b' > b$) leads to a smaller set of pooling equilibrium prices.*

The critical b^c is increasing in λ and decreasing in r.

The following key points emerge from Theorem 1 and Proposition 1 and its proof.

1) for small values of b, the signalling features of the model dominate, making the equilibrium set of prices larger as b grows. In particular, for very small b, competition (even with signalling) ensures that the equilibrium price will be very close to c. As b grows and competition decreases, the signalling aspects of the model (that as usual tend to increase the set of equilibria) determine that the set of equilibrium prices grows.

2) for larger values of b, the altruistic motive dominates, and the equilibrium set of prices shrinks in b (as the industry becomes more concentrated).

3) the threshold or cutoff is decreasing in r. When the altruistic motive is important (when r is "large" so our assumption about altruistic firms is restrictive) the equilibrium set of prices decreases for a larger range of bs.

4) the threshold is increasing in λ. The reason for this comparative statics is the following. As λ falls, the behavior of consumers becomes less responsive to anger. Then, selfish firms are less willing to pool with altruistic firms because consumers will not punish them much if they find out that a firm is selfish.[11]

The following result illustrates another straightforward feature of the model: when for some exogenous reason consumers become "captive" of one particular firm, anger is more

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[11]Note that this suggests that this particular social emotion has an instrumental value for the economy. Consumer anger incentivizes the opportunistic firms to engage in self-regulation. On the functional role of emotions, see Coricelli and Rustichini (2010) and Dessi and Zhao (2011).

likely. When the elasticity of demand decreases, local monopolies have an incentive to increase prices. The temptation may be large enough that an anger-triggering price increase may be profitable. The motivation for this result is the "raising prices in a snow storm" scenario considered in the classic paper on fairness by Kahneman, Knetsch and Thaler (1986).[12] We model this increase in captivity by changing the transport cost of consumers going to rivals, while keeping rival's prices fixed.[13]

Proposition 2 *Assume that for a given parameter configuration, there is a pooling equilibrium with a price of p^o. If the cost of transportation to firms $i-1$ or $i+1$ increases from 1 to $t > 1$, but the cost of getting to firm i remains constant, the firm's incentives to increase price increase. There is a threshold t^* such that if $t \geq t^*$ firm i raises its price and consumers become angry.*

This result assumes that consumers continue to make inferences based on the equilibrium prior to the shock. Although one could argue that a new equilibrium (one with fewer firms) should be the benchmark, we believe that keeping the old equilibrium beliefs is also plausible. In addition, note that the case of fewer firms also leads to more anger, as established by Proposition 1.

Reference Utility and the "Disciplined Approach" (see Kőszegi and Rabin, 2006)

Models concerned with reference points (including fairness models) have to decide how to model it in a way that is appealing (non arbitrary) and consistent with the evidence. It is also helpful if it is straightforward how to track the proposed deviation from standard economic models. For example Heidhues and Kőszegi (2008) use a disciplined approach introduced by Kőszegi and Rabin (2006), basing the reference-dependent preferences on classical models of intrinsic utility taken straight from Salop (1979). Importantly, they endogenize the reference point as lagged rational expectations, in a way that if there is no loss aversion, their theory reduces to Salop's. Likewise, we base our model in Salop (1979) and endogenize the "target"

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[12]They ask "A hardware store has been selling snow shovels for $15. The morning after a large snowstorm, the store raises the price to $20. Please rate this action as: Completely Fair, Acceptable, Unfair or Very Unfair." Almost 82 percent of respondents considered it unfair for the hardware store to take advantage of the short-run increase in demand associated with a blizzard.

[13]This keeps the number of competitors constant for the firm being analyzed. An equivalent way of modeling this is assuming that the two neighbors of the firm being analyzed move farther away, as if there had been a decrease in the number of firms.

level of utility as the utility that can be obtained in a reasonably competitive model with selfish firms. When there is no anger (at insufficiently altruistic firms), our model reduces to Salop's.

IV   Regulation and Welfare

We now analyze the welfare gains from regulation in a monopoly setting. We do so to simplify the exposition and the contrast with the gains from regulation in the standard model. Note that both pooling and separating equilibria are possible (in principle) in a monopoly. Anger will only arise in a separating equilibrium, so that is the main focus of this section. For reference, we note that the analysis of the pooling equilibrium in monopoly is straightforward.

The reader may wonder whether a Becker-type argument of the kind "if selfish firms make higher profits, won't altruistic firms be wiped out of the market in the long run?" is valid. Although the analysis of such a claim is worthwhile, it is beyond the scope of this paper. Two related arguments against the evolutionary advantage of selfish firms must be made, however. Selfish entrepreneurs can make higher bids than altruistic entrepreneurs if the rights to run a monopoly are auctioned (as they make higher profits). Nevertheless, depending on the price offered by altruistic firms in a potential auction, it could be optimal for selfish firms to pool with the altruistic firms, and avoid consumer anger in the monopoly game that ensues (in this equilibrium there must be relatively few firms participating, so that a lottery over the firms tied with the highest bids is still more profitable than offering one more cent, winning the auction, but angering consumers). In addition, one must bare in mind that it is not true in general that only selfish firms will survive in the long run. The question of whether a firm that cares only about it's profits will beat the competition (if the competition has different preferences) has been analyzed in the context of Cournot oligopoly for several variations of the standard preferences (see for example Vickers, 1984 and Fershtman and Judd, 1987). Note that we do not assume that altruism is widespread, but instead allow for a very small proportion of truly altruistic firms and explain how this can result in a set of beliefs and expectations that give rise to an equilibrium where profit maximizing behavior is not present.

Separating Equilibrium in a Monopoly

We now study the welfare effects of regulating a monopoly. To do so, we must first characterize the separating equilibria when there is only one firm. The type of equilibrium we focus on is one in which beliefs are "don't reject that the firm is altruistic iff $p \leq \bar{p}$" for some price $\bar{p}$. Our results do not depend on this assumption, which is quite natural in this context. Two cases can arise: for the altruistic firm the consumer's utility is above the threshold, or it is below.

If the consumer's utility is below the threshold for the price of the altruistic firm in some equilibrium, then both firms face the same incentives, and that can't be a separating equilibrium (not a strict one at least[14]). The same is true if the consumer's utility is above the threshold for both prices. Therefore, we will only focus on separating equilibria in which the high price yields a utility below the threshold, and the low price a utility above the threshold. That is, in the equilibria we analyze, we will have $p_a \leq p^\tau$, for p_a the price of the altruistic firm in equilibrium, and p^τ the highest price that gives consumers their target utility when they are not angry. If the consumer is to attain a utility of τ, we must have p^τ defined by

$$U = 2 \int_0^{s-p^\tau} (s - p^\tau - x) \, dx = (s - p^\tau)^2 = \tau \Leftrightarrow p^\tau = s - \sqrt{\tau}. \tag{3}$$

We now give necessary and sufficient conditions for a pair of prices (p_s, p_a), one for the selfish firm, one for the altruistic firm, to be part of a separating equilibrium. To do so, first note that in a separating equilibrium the consumer knows when the firm is selfish, and the monopolist must maximize $(p - c) D$, where $D = 2x$ for x such that

$$s - p - x - \lambda (p - c) = 0 \Leftrightarrow x = s - p(1 + \lambda) + \lambda c. \tag{4}$$

Of course, it must also be the case that $x \leq 1/2$ (otherwise, $D = 1$). In order for x to be less than $\frac{1}{2}$ we must have $p \geq \frac{s + c\lambda - \frac{1}{2}}{\lambda + 1}$ (in the standard case, with $\lambda = 0$, this just says that the individual located at $x = 1/2$ has negative net surplus from buying the good).

Hence, profits for the selfish monopolist are

$$(p - c) 2 (s - p(1 + \lambda) + \lambda c) \Rightarrow p = \frac{c(1 + 2\lambda) + s}{2(1 + \lambda)} \Leftrightarrow \pi^s = \frac{(c - s)^2}{2(1 + \lambda)}. \tag{5}$$

Note that consumer anger has two different effects on demand. First, it reduces demand (see equation 4): $dD/d\lambda = 2(c - p) < 0$. The second is less direct and involves the effect on

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[14]The firm charging the high price would make more profits out of the larger price, but less from the punishment, than the firm charging the low price. The two effects would net out.

the incentives of the firm (that is, the effects on marginal revenue). In this setting, price as a function of quantity Q is

$$Q = D = 2\left(s - p\left(1 + \lambda\right) + \lambda c\right) \Leftrightarrow p = \frac{2s - Q + 2c\lambda}{2\left(1 + \lambda\right)}$$

which implies that marginal revenue is

$$pQ = \frac{\left(2s - Q + 2c\lambda\right)}{2\left(1 + \lambda\right)}Q \Rightarrow MgR = \frac{s - Q + c\lambda}{\lambda + 1}.$$

Notice that in the standard model (with $\lambda = 0$), marginal revenue equal marginal cost implies that $Q^* = s - c$. As λ increases (from 0), the effect on marginal revenue is given by $dMgR/d\lambda = (Q - Q^*)/(\lambda + 1)^2$ which is negative for $Q < Q^*$ and positive for $Q > Q^*$. Hence, for $Q < Q^*$, the monopolist facing angry consumers has a smaller incentive to increase Q (quantity demanded is more sensitive to price, so increasing quantity on the margin, requires a bigger drop in price than when λ was 0). Similarly, for $Q > Q^*$ the monopolist facing angry consumers has a smaller incentive to decrease Q. But since the sign of $MgR - c$ is the same as before the change in λ, the optimal quantity is the same as in the standard model:

$$Q^\lambda = 2\left(s - p^m\left(1 + \lambda\right) + \lambda c\right) = 2\left(s - \frac{c\left(1 + 2\lambda\right) + s}{2\left(1 + \lambda\right)}\left(1 + \lambda\right) + \lambda c\right) = s - c.$$

Lemma 1 *In a separating equilibrium, the only possible price for the selfish firm is the price that maximizes profits when consumers are angry:*

$$p_s = \frac{c\left(1 + 2\lambda\right) + s}{2\left(1 + \lambda\right)} \Leftrightarrow \pi_s = \frac{\left(c - s\right)^2}{2\left(1 + \lambda\right)}. \tag{6}$$

We now find the range of prices for the altruistic firm that can be part of a separating equilibrium.

Lemma 2 *In a separating equilibrium the price p_a of the altruistic firm must satisfy*

$$\frac{s + c}{2} - \frac{s - c}{2}\sqrt{\frac{\lambda}{\lambda + 1}} \geq p_a \geq \frac{s + c}{2} - \frac{1}{2}\sqrt{\frac{\lambda}{\lambda + 1}\left(c - s\right)^2 + 2\alpha}. \tag{7}$$

Moreover, any price in that range can be sustained as a separating equilibrium, as long as it gives consumers their target level of utility.

For an equilibrium with $p_a \leq p^\tau$ to exist, we must have of course $p^\tau \geq \frac{s+c}{2} - \frac{1}{2}\sqrt{\frac{\lambda}{\lambda+1}(c-s)^2 + 2\alpha}$ (otherwise the range is empty). If we continue with the assumption that τ is consumer utility in an oligopoly with $\frac{1}{b} + r$ firms, so that $\tau = s - c - \frac{5}{4(1/b+r)}$, the condition for existence of a separating equilibrium becomes (from equation 3)

$$p^\tau = s - \sqrt{s - c - \frac{5}{4\left(1/b + r\right)}} \geq \frac{s+c}{2} - \frac{1}{2}\sqrt{\frac{\lambda}{\lambda+1}(c-s)^2 + 2\alpha}.$$

Regulation

In Lemmas 1 and 2 we characterized the set of separating equilibria in a monopoly. We now turn to regulation.

Recall that we have assumed $s \leq c + 1$, which was the condition for the market not to be fully served by a monopoly. We compare two types of regulatory policies: mandated prices for the firms, and subsidies.

Consider a situation where there is a separating equilibrium and the firm is perceived to be selfish (a possible example is US railroads at the time of the Sherman Act). What is total welfare? Consumer utility is, using p_s from equation 5,

$$2\int_0^{s-p-\lambda(p-c)} \left(s - p - \lambda\left(p - c\right) - x\right) dx\bigg|_{p=p_s} = \frac{(s-c)^2}{4}.$$

Notice that consumer welfare is exactly the same as in the case where the consumer's utility is standard: the expression of consumer welfare is independent of λ. The reason is that, while for each price less consumers would purchase because anger diminishes the incentives to purchase, the monopolist lowers his price so that exactly the same number of consumers as before purchases:

$$\frac{D}{2} = s - \lambda\left(p_s - c\right) - p_s = s - \lambda\left(\frac{c\left(1 + 2\lambda\right) + s}{2\left(1 + \lambda\right)} - c\right) - \frac{c\left(1 + 2\lambda\right) + s}{2\left(1 + \lambda\right)} = \frac{s - c}{2}.$$

In order for the marginal consumer to be the same (with $\lambda > 0$ or $\lambda = 0$) the price decrease must exactly offset anger; indeed, an increase in λ decreases price p_s as $\frac{dp_s}{d\lambda} = \frac{c-s}{2(\lambda+1)^2} < 0$. Since transportation cost (or taste) x is additive, the effect on every other consumer is exactly the same as with the marginal consumer, and therefore total utility is the same.

In brief, the reason for the price decrease is that demand becomes more elastic when λ grows. This lower optimal price leads to a decrease (relative to the standard case) of the

welfare of the firm:

$$(p - c) \, D|_{p=p^s} = (p - c) \, 2 \left(s - \lambda \left(p - c\right) - p\right)|_{p=p_s} = \frac{(s-c)^2}{2 \left(1 + \lambda\right)}.$$

We now calculate the welfare in six cases: standard and anger model, crossed with 3 policies; laissez faire, regulated price $p = c$ and a subsidy under which $p = c$ and the monopolist gets $p_s - c$ per unit from the government, as a compensation for the lower price to consumers. For these calculations we assume that even for $p = c$, not all consumers are served.

In the standard model, as has been argued, the firm maximizes $(p - c) \, 2 \left(s - p\right)$, charges an optimal price of $p^* = \frac{c+s}{2}$ and obtains profits of $\pi^* = \frac{(c-s)^2}{2}$. The rest of the cases are given by:

	Firm's Profits in Standard and Anger Models	
Policy↓	Standard Model	Anger Model
Laissez Faire	$\frac{(c-s)^2}{2}$	$\frac{(s-c)^2}{2(1+\lambda)}$
Regul.	0	0
Subsidy	$(p^* - c) \, 2 \left(s - c\right) = (c - s)^2$	$(p^s - c) \, 2 \left(s + \lambda \left(c - p^s\right) - c\right) = \frac{(\lambda+2)(c-s)^2}{2(\lambda+1)^2}$

Consumer welfare is given by

	Consumer Welfare in Standard and Anger Models	
Policy↓	Standard Model	Anger Model
Laissez	$2\int_0^{s-\frac{c+s}{2}} \left(s - \frac{c+s}{2} - x\right) dx = \frac{(c-s)^2}{4}$	$2\int_0^{s+\lambda(c-p_s)-p_s} \left(s + \lambda \left(c - p_s\right) - p_s - x\right) dx = \frac{(c-s)^2}{4}$
Regul.	$2\int_0^{s-c} \left(s - c - x\right) dx = (c - s)^2$	$2\int_0^{s+\lambda(c-c)-c} \left(s + \lambda \left(c - c\right) - c - x\right) = (c - s)^2$
Subsidy	$2\int_0^{s-c} \left(s - c - x\right) dx = (c - s)^2$	$2\int_0^{s+\lambda(c-p_s)-c} \left(s + \lambda \left(c - p_s\right) - c - x\right) = \frac{(\lambda+2)^2(c-s)^2}{4(\lambda+1)^2}$

Note that in the anger model, the consumer cares not only about how much he pays, but also about how much the firm receives. In calculating the subsidy, we assume that the firm gets p_s, the price in the absence of regulation. Interestingly consumer welfare is the same in the absence of regulation; not only that, the consumer who is indifferent between buying and not buying is also the same individual; the price reduction, that the monopolist must make in the anger model, leaves the welfare of each consumer intact.

Then, total welfare in all scenarios is

Policy↓	Total Welfare in Standard and Anger Models	
	Standard Model	Anger Model
Laissez	$\frac{(c-s)^2}{4} + \frac{(c-s)^2}{2} = \frac{3(c-s)^2}{4}$	$\frac{(c-s)^2}{4} + \frac{(s-c)^2}{2(1+\lambda)} = \frac{(\lambda+3)(c-s)^2}{4(\lambda+1)}$
Regul.	$(c-s)^2 + 0$	$(c-s)^2 + 0$
Subsidy	$(c-s)^2 + (c-s)^2 = 2(c-s)^2$	$\frac{(\lambda+2)^2(c-s)^2}{4(\lambda+1)^2} + \frac{(\lambda+2)(c-s)^2}{2(\lambda+1)^2} = \frac{(c-s)^2(\lambda^2+6\lambda+8)}{4(\lambda+1)^2}$

Since consumer welfare with and without anger is the same, and the profits of the monopolist are lower with anger, total welfare in the economy is lower in the anger model.

The following table shows the gains to regulation: total welfare after regulation, minus total welfare before regulation. An obvious point that we haven't addressed yet is where is the money for subsidies coming from? How is it counted in total welfare? We will address this issue shortly.

Policy↓	Benefits of Interventions in Standard and Anger Models	
	Standard Model	Anger Model
Regul.	$(c-s)^2 - \frac{3(c-s)^2}{4} = \frac{(c-s)^2}{4}$	$(c-s)^2 - \frac{(\lambda+3)(c-s)^2}{4(\lambda+1)} = \frac{(c-s)^2(3\lambda+1)}{4(\lambda+1)}$
Subsidy	$2(c-s)^2 - \frac{3(c-s)^2}{4} = \frac{5(c-s)^2}{4}$	$\frac{(c-s)^2(\lambda^2+6\lambda+8)}{4(\lambda+1)^2} - \frac{(\lambda+3)(c-s)^2}{4(\lambda+1)} = \frac{(c-s)^2(2\lambda+5)}{4(\lambda+1)^2}$

In both the standard and in the anger models the government subsidy equals the firm's profit: $T_A = \frac{(\lambda+2)(c-s)^2}{2(\lambda+1)^2}$ is the transfer in the anger case and $T_S = (c-s)^2$ in the standard case. It is easy to check that the subsidy is always larger in the standard case; yet, as we now show, it is not the extra subsidy in the standard case that make subsidies less attractive in the anger model. Let $\Delta_{St.}^{S-R}$ be the difference in welfare between Subsidies and Regulation in the standard model (by how much more do subsidies increase welfare); similarly, let $\Delta_{Ang.}^{S-R}$ be the difference in welfare between Subsidies and Regulation in the anger model. We have that

$$
\begin{aligned}
\Delta_{St.}^{S-R} - \Delta_{Ang.}^{S-R} &= (c-s)^2 - \frac{(c-s)^2\left(4 - 3\lambda^2 - 2\lambda\right)}{4(\lambda+1)^2} = \frac{1}{4}\frac{\lambda(c-s)^2(7\lambda+10)}{(\lambda+1)^2} \\
&> (c-s)^2 - \frac{(\lambda+2)(c-s)^2}{2(\lambda+1)^2} = T_S - T_A
\end{aligned}
$$

Hence, imagine that due to the costs of raising the money (or the political economy costs) the regulator was indifferent between the two policies when he thought the economy was a

standard one. If he learns that consumer preferences include the anger term that we study in this paper, he would favor regulation without subsidies.

Although subsidies are less attractive than in the standard model, good old fashioned price setting (the policy we have called "Regulation") by the regulator is better in the model with anger:

$$\frac{(c-s)^2 (3\lambda + 1)}{4 (\lambda + 1)} - \frac{(c-s)^2}{4} = \frac{1}{2} \frac{\lambda}{\lambda + 1} (c-s)^2 > 0$$

Three channels in the Regulation of Monopoly

To summarize: there are three channels through which regulation can potentially increase welfare in our model where consumers react with anger at prices they consider to be unfair.

1. There is a standard channel whereby a reduction in price from above marginal costs increases total welfare by getting a good of cost c to be produced and transferred to a consumer who values it at s.

2. For each consumer, who was purchasing and was angry, a reduction in price increases total welfare by reducing his anger (because the firm is making lower profits).

3. Finally, any channel that reduces anger (whether it reduces price or not) induces people who were out of the market to start buying the good, and that also increases total welfare. Imagine for example a policy that kept the price fixed, but "expropriated" the profits from the firm. In that case, in the standard model, welfare would be unchanged. In the current model welfare increases for two reasons: first, each consumer who was purchasing before, is happier. But also, some consumers who were not purchasing, will now become customers.
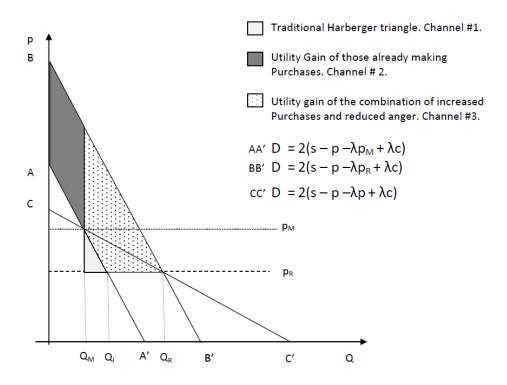
Figure 1. Three Channels through which a reduction in price from the monopoly price p_M to the regulated price p_R increases welfare.

Figure 1 depicts the three channels described above, which go beyond the standard Kaldor-Hicks potential efficiency gains.[15] Consider a regulator who induces a change in the price from the monopoly price p_M to p_R. Assume he does so in two (imaginary) steps: he first reduces the price paid by the consumer, while keeping the price received by the monopoly at p_M; in the second (imaginary) stage, the regulator reduces the price received by the monopoly from p_M to p_R. The locus AA' depicts demand when the price paid by the consumer varies, but the price received by the firm is fixed at p_M, $D = 2(s - p + \lambda p_M + \lambda c)$. In that case, when the price paid by the consumer is changed by the regulator to p_R, the demand function is fixed, and the quantity demanded changes to the intermediate amount $Q_I = 2(s - p_R + \lambda p_M + \lambda c)$. At that stage, welfare has increased only through the first channel, the traditional Harberger triangle (light gray in Figure 1). Then, when the regulator changes the price received by the firm, the new demand curve is the locus BB',

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[15] Trivially, they are Kaldor-Hicks gains when consumers maximize an objective that has a fairness component. An interesting extension of our model is to consider the possibility of an emotional cost to those that are the target of anger, as firms might want to be popular with consumers (particularly when the owner has to live in the same community as consumers) and regulation introduces other welfare terms.

$D = 2\left(s - p + \lambda p_R + \lambda c\right)$. Consumers who were already purchasing Q_M units, will increase their welfare due to the reduced anger; this is the dark gray area in Figure 1, which corresponds to the second channel. Finally, the change in the price received by the monopoly induces additional purchases of $Q_R - Q_I$ from individuals for whom the reduction in anger makes the purchases worthwhile. These new sales generate additional welfare through the first (traditional) channel, since units that cost less than what consumers value them are being exchanged. This combination is the third channel, the dotted trapezoid in Figure 1. The demand function when the price changes are not broken down in the two imaginary steps is given by $D = 2\left(s - p + \lambda p + \lambda c\right)$ and is locus CC' in the figure above.

V Conclusions

We present a model where the need to regulate a firm arises because consumers sometimes have adverse emotional reactions to high prices. The root assumption is that consumers get angry when they think that a firm is charging "abusive" or "exploitative" prices. We model this by assuming that consumers experience utility from consumption at low prices (a standard material payoff) and disutility from observing high profits in the hands of firms that have displayed low levels of altruism towards their clients (an emotional payoff). In the context of a simple monopolistic competition model along the lines of Salop (1979), this implies that firms experience large drops in demand when their activities (e.g., price selections) irritate consumers. We show that market equilibrium in these circumstances displays a series of interesting properties. For example, the client of a firm who discovers that the owner is (say) a criminal experiences a utility loss (while no such loss is present in standard economic models). Moreover, in some circumstances, even with a very low proportion of truly altruistic firms, most firms in the market charge a low price in order to appear to be kind.

The main result of the paper is that, in a reasonable set of circumstances, anger is more likely as the number of firms falls and competition decreases.[16] This happens because a

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[16]Some economists have debated whether corporate social responsibility involves more than just making profits (see, for example, Friedman, 1970, Rose-Ackerman, 2002, Calveras, Ganuza and Llobet, 2007, *inter alia*). A key question is whether competition will curtail unethical behavior (see Shleifer, 2004). Our model emphasizes beliefs and introduces a demand for ethical behavior (defined as one that reveals a high concern for the well-being of others). It shows that intense competition between firms (which allows consumers

feature of the equilibrium is that, as the number of firms in the market drops, switching to a firm that has not raised prices becomes more costly to the consumer, and the threat to punish unkind firms by not purchasing from them becomes less credible. This leads to price increases by firms, which in turn lead to anger. This phenomenon introduces a new potential justification for regulation: by reducing the profits of firms revealed to be unkind, anger of captive consumers (and of the public that is witness to the "abuse") falls and consumer welfare is increased. This is consistent with the widespread wish to regulate utilities (like water and sewage), even though it is clear that high prices bring about small reductions in consumption.

The second contribution of the paper is to illustrate these gains from regulation in the context of monopoly. There are three channels: regulation helps through the standard channels (increasing output when it is valuable), through a purely emotional channel (captive consumers are less angry as unkind firms earn less in profits), and through a mixed channel (individuals who were out of the market as they were too angry in the unregulated market, decide to purchase and reduce the standard distortions described in the first channel). The anger mechanism emphasized here suggests that firms will invest resources in "public relations" trying to appear kind, or by advertising campaigns emphasizing the founder's philanthropy and identity (in contrast to an anonymous set of shareholders; see also Figure 2).[17]

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to easily switch) gives consumers a weapon to "punish" firms that do not behave as demanded. Thus, competition is associated with more "ethical behavior".

[17]See Marchand (1998) who studies the role of corporate imagery in the creation of the idea that corporations have a "soul". He states, "The crisis of legitimacy that major American corporations began to face in the 1890's had everything to do with their size, with the startling disparities of scale." (Marchand, 1998, p. 3). Indeed, it is possible to argue that there is a parallel between our paper's focus on the concept of commercial legitimacy and the concept of State legitimacy in political science.

Figure 2. An ad in the campaign by Bell Telephone System to humanize the corporation.

Fairness has been the focus of a growing literature in economics. Our paper's contribution is to lay out a simple framework to discuss how such considerations may help understand better the benefits of regulating monopolies. Specifically, we show how anger and competition are connected and how the anger/fairness objective modifies the simple Kaldor-Hicks criteria (based only on efficiency considerations) yielding three channels through which monopolies affect welfare. The framework can also be applied to help explain the choice between different regulatory approaches, such as anti-trust versus regulatory agencies or between regulatory instruments, such as fines versus price regulation.

VI   Appendix: Proofs

Proof of Theorem 1.   Necessity. We first show that p^o must satisfy equation (1). Suppose p^o is part of a pooling equilibrium, which yields profits of $(p^o - c) b$ to the firm, and suppose that the firm is considering a decrease in the price. If the firm lowers its price, consumers won't be angry. In that case, demand is given by the sum of all (unit) demands of consumers who are closer to the deviating firm than the two consumers (one to each side)

who are indifferent:[18]

$$s - p - x = s - p^o - (b - x) \Leftrightarrow D = 2x = p^o - p + b$$

Profits and the optimal price in the deviation are then

$$\pi = (p - c)(p^o - p + b) \Rightarrow p^d = \frac{p^o + b + c}{2}$$

For the firm not to want to deviate from p^o, it must be the case that this optimal price is larger than p^o, or equivalently

$$b + c \geq p^o. \qquad (A1)$$

In words, if the oligopoly price is too large, the firms are better off lowering their price, and the consumers will not punish them (by getting angry). In the calculation of this upper bound on p^o we have not considered whether consumers are obtaining their target level of utility because it either plays no role (if after the deviation consumers are still not getting their target level), or the deviation is even more profitable for the firm.

We now derive a second, tighter, upper bound on p^o. Consumer utility (in a pooling equilibrium with $1/b'$ firms and a price p) is the number of firms, $1/b'$, times the total utility of consumers served by each firm (the 2 in the equation below is because each firms serves consumers to both sides)[19]:

$$\frac{2}{b'} \int_0^{\frac{b'}{2}} (s - p - x) \, dx = s - p - \frac{b'}{4}. \qquad (A2)$$

---

[18] Recall that we have assumed that there are n consumers, and we have normalized $n = 1$. We have argued that this is not the same as the assumption that there is a continuum of mass 1 of consumers. Still, when calculating demand, and elsewhere, the intuitions for the results will be conveyed "as if" we had assumed the continuum version, since it is easier to explain equations that way. For example, in this case, the explanation with 1 consumer would be: "In that case, demand is given by the probability that the consumer is located closer to the deviating firm than the locations that would leave him indifferent between purchasing from the deviating firm and its neighbors."

[19] Here the definition of what utility to consider (for consumers) is not obvious. Why consider total utility of all consumers? Maybe firm 1 is behaving really badly and slaughtering its consumers, but still total utility is large in the market, and so firm 1 experiences no utility cost of having a high price. In equilibrium this will make no difference (if firm 1 is treating its consumers badly, all firms are doing the same), but it matters in a deviation. In the set of questions we will analyze in this paper, this makes no difference, but in general it would seem more "psychologically plausible" that the firm cares about how it treats its consumers, and not about "average utility in the market (including the welfare of other firms' consumers)".

This utility is larger than τ if and only if

$$s - p^o - \frac{b}{4} \geq \tau \Leftrightarrow s - \tau - \frac{b}{4} \geq p^o.$$

Given our assumption that τ is the utility in a Salop equilibrium with $\frac{1}{b} + r$ firms, one can see (from a derivation similar to that leading to equation A1) that the equilibrium price is $\frac{1}{1/b+r} + c$, so that the target level is given by equation (A2) with $b' = \frac{1}{1/b+r}$ and this price level: $\tau = s - c - \frac{5}{4(1/b+r)}$. In order for the equilibrium price in a market with $1/b$ firms to guarantee a utility of τ we need that

$$s - p^o - \frac{b}{4} \geq s - c - \frac{5}{4(1/b+r)} \Leftrightarrow c + \frac{5}{4(1/b+r)} - \frac{b}{4} \geq p^o \Leftrightarrow \frac{1}{4}\frac{4-br}{br+1} \geq \frac{p^o - c}{b}.$$

Since the lhs of this last inequality is less than 1, we see that this is indeed a tighter bound on p^o than that given in (A1).

In order to see that this is an upper bound on the equilibrium prices, we now show that if the equilibrium price p^o was such that $b + c \geq p^o > c + \frac{b}{4}\frac{4-br}{br+1}$, an altruistic firm would choose to lower its price, yielding a contradiction. The equilibrium utility of an altruistic firm in this case is $U^*(p^o) = (p^o - c)b - \alpha$. If the firm lowered its price to $p = c + \frac{b}{4}\frac{4-br}{br+1}$ demand would be $p^o - p + b$ and utility

$$U^d(p^o) = (p - c)(p^o - p + b) = \frac{b}{4}\frac{4-br}{br+1}\left(p^o - c + \frac{5b}{4}\frac{br}{br+1}\right).$$

Since the coefficient on p^o is less than b, $U^*(p^o) - U^d(p^o)$ is increasing in p^o. We now show that for the largest p^o in the range, $p = b + c$, we have $U^*(b+c) < U^d(b+c)$, implying that an altruistic firm would deviate for any $p^o \leq b + c$. By assumption, $\sqrt{\alpha} > \frac{5b}{4}\frac{br}{br+1}$, so that

$$\alpha > \left(\frac{5b}{4}\frac{br}{br+1}\right)^2 \Rightarrow U^*(b+c) = b^2 - \alpha < b^2 - \left(\frac{5b}{4}\frac{br}{br+1}\right)^2$$

$$= \frac{b^2}{16}\frac{(4-br)(9br+4)}{(br+1)^2} = U^d(b+c)$$

We now establish the lower bound on the equilibrium prices. Suppose p^o is part of a pooling equilibrium, which yields profits of $(p^o - c)b$ to the firm, and suppose that the firm raises its price to p. Consumers become angry and the individual who is indifferent is that located at x given by $s - p - x - \lambda(p - c) = s - p^o - (b - x)$ so demand and profits are

$$D = p^o - (1 + \lambda)p + b + \lambda c \Rightarrow \pi = (p - c)(p^o - (1 + \lambda)p + b + \lambda c)$$

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For the firm not to want to deviate and charge the optimal price

$$p = \frac{p^o + b + c(1 + 2\lambda)}{2(\lambda + 1)} \Rightarrow \pi^* = \frac{(p^o - c + b)^2}{4(1 + \lambda)} \tag{A3}$$

it must be the case that profits in the equilibrium are larger than these deviation profits.[20] Formally,

$$(p^o - c)b \geq \frac{(p^o - c + b)^2}{4(1 + \lambda)} \Rightarrow \frac{p^o - c}{b} \geq 1 + 2\lambda - 2\sqrt{\lambda(1 + \lambda)}.$$

Sufficiency is trivial. Pick any price p^o in the set, and set beliefs of the consumers to be "the firm is selfish with probability 1 if $p > p^o$, and 0 otherwise." It is easy to check that all firms setting a price of p^o is an equilibrium. ∎

Proof of Proposition 1. Let $f(b) = \frac{b}{4}\frac{4 - br}{br + 1}$, and note that $f'(b) = \frac{4 - b^2 r^2 - 2br}{4(br + 1)^2}$ is such that $f'(0) = 1$, $f''(b) < 0$ and, by assumption of the proposition, for some $b \leq \frac{1}{2}$, $f'(b) < 1 + 2\lambda - 2\sqrt{\lambda(1 + \lambda)} < 1$. Therefore, there exists a unique b^c such that $f'(b^c) = 1 + 2\lambda - 2\sqrt{\lambda(1 + \lambda)}$.

From equation (2), the set of pooling equilibrium prices decreases in b whenever $f(b) - b\left(1 + 2\lambda - 2\sqrt{\lambda(1 + \lambda)}\right)$ decreases, and this expression is decreasing for all $b > b^c$.

From the definition of b^c, we have

$$\frac{4 - b^{c2}r^2 - 2b^c r}{4(b^c r + 1)^2} = 1 + 2\lambda - 2\sqrt{\lambda(1 + \lambda)}.$$

Since the right hand side is decreasing in λ and the lhs is decreasing in b, b^c is increasing in λ. Also, an increase in r must be matched by a decrease in b^c ∎

Proof of Proposition 2. When the cost of getting to firms $i - 1$ and $i + 1$ increases to t, the demand faced by firm i (after an increase in price) and its profits, are

$$D = 2\frac{p^o - p + \lambda(c - p) + bt}{t + 1} \quad \pi = (p - c)2\frac{p^o - p + \lambda(c - p) + bt}{t + 1}$$

and the optimal price and profit are

$$p = \frac{c + p^o + 2c\lambda + bt}{2\lambda + 2} \Rightarrow \pi = \frac{(p^o - c + bt)^2}{2(\lambda + 1)(1 + t)}.$$

---

[20]It could happen that the firm considers raising its price and discovers that the optimal price in the deviation with angry consumers is lower than p^o (this happens if p^o is larger than the optimal price, given in equation A3). If that happens, the firm is better off not raising its price. Hence, our assumption that the optimal price in a deviation is achieved with angry consumers is justified.

For large enough t, these profits exceed the oligopoly profit, and the firm raises its price, causing anger. ∎

Proof of Lemma 1. Suppose p_s is not as in equation (6). Since p_s is a (separating) equilibrium price, consumers will know that the firm is selfish and will therefore be angry. Hence, playing p_s must be better than playing any price p for which consumers have rejected that the firm is altruistic: $(p_s - c) 2 (s - p_s (1 + \lambda) + \lambda c) \geq (p - c) 2 (s - p (1 + \lambda) + \lambda c)$. But the right hand side has a unique maximizer given by equation (6), so we obtain a contradiction. ∎

Proof of Lemma 2. Necessity. For the altruistic firm not to want to deviate (upwards) and charge its optimal price (the optimal price is the same as for the selfish firm) we must have,

$$2 (p_a - c) (s - p_a) \geq \frac{(c - s)^2}{2 (1 + \lambda)} - \alpha \Rightarrow p_a \geq \frac{s + c}{2} - \frac{1}{2} \sqrt{\frac{\lambda}{\lambda + 1} (c - s)^2 + 2\alpha}.$$

Similarly, the selfish firm must want to charge its equilibrium price, and not the maximum price for which consumers are not angry, $\bar{p}$. To connect this relationship with an upper bound on p_a, notice that we must have $p_a = \min \{\bar{p}, p^\tau\}$. This is so, first, because we must have $p_a \leq \min \{\bar{p}, p^\tau\}$ for beliefs to be consistent, and for consumers to obtain their target utility. Second, if we had $p_a < \min \{\bar{p}, p^\tau\}$, the altruistic firm could increase its price towards its optimal price (without anger) $\frac{c+s}{2}$; since $\bar{p}$ must be less than the price of the selfish monopolist, $\frac{c(1+2\lambda)+s}{2(1+\lambda)}$, we obtain

$$\frac{c + s}{2} > \frac{c (1 + 2\lambda) + s}{2 (1 + \lambda)} > \bar{p} \geq \min \{\bar{p}, p^\tau\} > p_a$$

and such a price increase would strictly increase its profits without lowering consumer utility below τ.

For the selfish firm not to want to deviate to $\bar{p}$, we must have

$$2 (\bar{p} - c) (s - \bar{p}) \leq \frac{(c - s)^2}{2 (1 + \lambda)} \Rightarrow p_a \leq \bar{p} \leq \frac{c + s}{2} - \frac{s - c}{2} \sqrt{\frac{\lambda}{\lambda + 1}}$$

and this establishes the upper bound for p_a.

Sufficiency. It is straightforward to check that for any $p_a \leq p^\tau$, and p_a in the range defined by equation (7), there is an equilibrium with $\bar{p} = p_a$. This condition defines μ as

$$\mu (p) = \begin{cases} 1 & p \leq \bar{p} \\ 0 & p > \bar{p} \end{cases}.$$

Given this, the selfish firm optimally charges p_s as in equation (6), the altruistic firm optimally charges $p_a = \bar{p}$, beliefs are consistent, and consumer's acquisition decisions are optimal given their beliefs and tastes. ∎

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