

Will Governments Fix What Markets Cannot? The Positive Political Economy of Regulation in Markets with Overconfident Consumers

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Abstract

Recent work in behavioral IO has shown that competition need not always eliminate inefficiencies associated with biased consumers. Regulations usually exist that could, but we show that self-governing citizen-consumers will rarely support such welfare-improving policies. Furthermore, biases can “infect” support for regulations that address more classical market imperfections. Consumer biases often have two effects: they produce deadweight losses, and they redistribute income away from biased consumers. The benefits of redistribution discourage regulation. We show that overconfidence limits support for regulation in a context with add-ons and imperfect commitment, and use the intuitions derived therein to reach similar conclusions for a broad collection of common models.

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1 Introduction

Markets with large numbers of imperfectly rational consumers can exhibit persistent and robust inefficiencies. Market competition can reduce the impact of biased consumer choices when firms compete for the rents available from exploiting biases. A variety of recent papers, however, provide theories and evidence that markets sometimes fail to restore efficiency when consumers are unaware of their biases (Gabaix and Laibson, 2006; Sandroni and Squintani, 2007; Grubb, 2009; Heidhues and Koszegi, 2010). Within the context of these models, appropriate policy responses such as mandatory information provision or restricting contractual forms will be able to increase social welfare. As a result, most behavioral public policy has focused on normatively optimal regulations to help biased consumers (Gabaix and Laibson (2006, section IV.B); Bar-Gill (2006, section IV); Heidhues and Koszegi (2010, section II.B)).¹

Almost no attention has been paid to the positive question of when these policies are likely to be adopted.² We take existing explanations of when competition fails to “fix” consumer biases as given and also assume that regulation exists that would restore the first best. We ask whether a self-governing set of citizens will choose policies which will improve welfare. In a simple model with overconfidence, we show that no consumer will strictly prefer policies that prevent welfare-reducing overconsumption, the inefficiency arising most directly from the consumer bias, and many consumers will strictly oppose it. Consumer overconfidence leads to “too much” demand in the market for goods and leads to “too little” demand in the market for regulation to correct that inefficiently high demand.

Furthermore, these consumer biases bleed over into the demand for regulation that would address a separate problem – limited commitment ability on the part of firms. In a market consisting of only rational consumers, everyone would always support efficient regulation to improve commitment. With imperfectly rational consumers, support for regulation of this imperfection is substantially weakened because the imperfection is necessary for rational consumers to benefit from the overconfident consumers’ mistakes. Intuitively, correcting the commitment problem increases total welfare but can leave a smaller share of the bigger pie to a subset of the rational.

Widespread consumer overconfidence thus leads to policy failures as well as market failures. The intuition here is that no one thinks that they are among the overcon-

¹Ellison (2006) surveys the nascent behavioral IO literature. For a recent synthesis of many of the applications of Behavioral Economics to IO, see Spiegler (2011).

²See Berggren (2011) for a recent quantification of the size of this gap in the literature.

fidest, and consequently everyone wants the opportunity to take advantage of the overconfident. When regulation does occur, it is not to prevent biased individuals from being exploited, but rather because the side effects of this exploitation harm rational individuals more than they benefit from the exploitation.

The specific model we develop in this paper is offered as an example of what we believe to be a common implication of markets with non-Bayesian consumers: that the conditions that lead to equilibrium deadweight losses in markets themselves often also lead to equilibrium regulation that tolerates avoidable deadweight losses. We can only rigorously prove these results only under specific assumptions about the underlying market and type of consumer bias. The results are stark to make the mechanism transparent. Adding further non-standard elements to the model, such as benevolent regulators or very altruistic consumer preferences would weaken our results. After developing these intuitions, however, we apply the same reasoning to several prominent analyses in the literature and show that they lead to substantively similar conclusions. Whenever there is scope for regulation to solve problems induced by biased consumers and not solved by markets, there is little or no support for regulation to correct these problems. When another market imperfection is introduced that interacts with consumer biases, support for regulation of that imperfection is also reduced.

We believe the dynamic of market/government failure we identify applies most directly to markets with non-Bayesian consumers. DellaVigna (2009) notes that the welfare and policy implications of nonstandard preferences often depend on whether consumers have rational expectations or nonrational expectations about those preferences. For example, time-inconsistent consumers who are fully aware of their time-inconsistency are willing to pay for commitment devices, and so will in equilibrium attain welfare-maximizing contracts.³ With consumers who are unaware of their time-inconsistency, or underestimate it, firms often make higher profits by taking advantage of them by offering tempting contracts (DellaVigna, 2009). We claim that the consumers will also oppose regulation that outlaws such contracts.

Our results will be interesting to two constituencies: the first and obvious one is behavioral economists interested in public policy. The second one is more skeptical economists who are nonetheless curious about the logical implications of the current stream of behavioral industrial organization research. We begin with a brief review of some policy responses often proposed on behavioral grounds. We then turn to

³But see Gottlieb (2008) for when commitment devices are not possible.

our specific model, solving first for the market equilibrium and then calculating the induced preferences over policy. Next, we apply the intuitions about induced preferences from our analysis to a number of prominent models in behavioral IO and come to broadly similar conclusions in each case. We delay until the last section the major application of our model, analysis of the credit card industry and recent regulation of that industry. Finally, we draw out some implications about the positive prospects of regulation to solve behavioral problems.

1.1 Policy Responses to Behavioral Biases

We are aware of only one paper that looks at how biases in consumer markets will play out in the corresponding regulatory “markets”. Glaeser (2006) is also pessimistic about the chances of successful behavioral public policy, but for different reasons than ours. He argues that government decisionmakers will often be even more prone to bias than private decisionmakers. For instance, consumers have weaker incentives to choose well when voting for politicians than when buying products or services and politicians may be less costly to mislead than consumers in general. Our paper is a complement to Glaeser’s work, since our focus is not on the implementation of regulation but on the more basic demand for regulation.

In our model, the policy response that citizens decide upon is a price regulation. In reality, there are other forms of policy response to the sorts of problems brought on by overconfidence. Governments could attempt to “debias” consumers, for example by requiring firms to educate their customers. Bertrand and Morse (2009), for instance, finds that consumer information regulations might be an effective policy tool when it comes to payday borrowing. But many choices are complex enough that relevant information cannot be quickly summarized (see, for example, Hastings and Weinstein (2008) or Mastrobuoni and Weinberg (2009)). Furthermore, educational interventions will likely fall prey to the same under-demand problems that we identify.

Much of the economics literature on policy responses proposes informational solutions, but direct intervention in the market seems at least as popular with advocacy groups and politicians. This regulation may be quite heavy-handed, like outlawing certain transactions or capping certain fees. Alternatively, it may be relatively light, such as a “nudge” towards certain options via strategically legislating a default option (Camerer et al., 2003; Thaler and Sunstein, 2009). In this paper we model regulation as a simple price cap, but our results would extend to more “libertarian” brands of regulation. Price caps largely act as instruments for closing down the ex-post mo-

nopolistic add-on market, so citizens will have similar preferences about other policy instruments that would limit after-market profits.⁴

2 Base Model: Sales to Biased Consumers by Firms with Limited Price Commitment

We build a standard model of an industry beset by problems induced by imperfectly rational consumers and in which commitment by firms is problematic. The commitment problem illustrates how biases can also affect support for regulation that corrects more standard market imperfections. Commitment problems are not required for a basic understanding of the direct relationship between imperfect rationality, market inefficiency, and the demand for corrective regulation. Our model is structurally similar to Sandroni and Squintani (2007) and Bubb and Kaufman (2009) (and, to a lesser extent, Gabaix and Laibson (2006) and Heidhues and Koszegi (2010)), in that it features overconfident agents who affect efficiency in a perfectly competitive equilibrium. Although formally similar, our contribution is quite different from both these papers. Sandroni and Squintani (2007) are interested in exploring the (limited) circumstances in which there is scope of Pareto-improving government regulation, and Bubb and Kaufman (2009) are interested in understanding the impact of the introduction of non-profit firms into such an economy. We see our primary contribution to be in taking a step beyond the (regulated) market equilibrium, and looking at citizens' induced preferences over regulatory policy. The particulars of the economic model were chosen to highlight those induced preferences.

2.1 Primitives

Payoffs and Production Consider a market with a base good and an add-on. There is a unit mass of consumers who receive a utility of 1 for consuming the base good, but may be subject to an event which reduces this value by k . We will call this event “needing the add-on.” The loss k may be the pure effect of the event or the consumer's cheapest way of responding to the event other than purchasing the add-on. Consumers can avoid this utility loss by consuming the add-on.

⁴Obviously heavy-handed regulation typically has more distortionary effects than mandating a default would, but we will abstract away from these implementation problems. If voters are also skeptical about the efficiency of government regulation, it will just make regulation even more unlikely to fix biases when markets do not.

A set of perfectly competitive producers produce the base good at constant marginal cost C . There is free entry into the base-good market. The add-on good is costless to produce, and it is specific to the base good produced by any given producer.⁵ Finally, define $G \equiv 1 - C$ as the gains from trade in the market.

Actions and Timing We divide market behavior into four periods. In the first period, firms set their prices simultaneously, where firm i chooses price $p_{B,i}$ for the base good and $p_{A,i}$ for the add-on. In the second period, consumers observe these prices and choose whether to buy the base good and from whom. A firm pays the cost of production if and only if a consumer buys its base good.

In the third period, firms may have the opportunity to reset their add-on price. This opportunity to renege arises with probability r . This opportunity may arise due to consumer inattention, classic problems with incomplete contracts, or the inability of consumers to discriminate perfectly between a binding promise and cheap talk or marketing.⁶ In the last period, consumers learn whether or not they are subject to the welfare shock and the price of the add-on that they face and then decide whether or not they want to buy the add-on.

Types and Information There are three types of consumers. High-risk consumers will need the add-on with probability α_h and low-risk consumers will need it with probability $\alpha_l < \alpha_h$. High-risk consumers make up a fraction β of all consumers, while low-risk consumers make up the remainder. In addition, a fraction γ of the high-risk consumers are overconfident and believe incorrectly that they are low risk. They are perfectly certain about this belief but incorrect. Consumers (believe they) know their own type during period 1, but firms never observe consumers' types directly.⁷ The distribution of types is common knowledge, including the presence of the overconfident types, as are the firms' costs. Let $\bar{\alpha} \equiv \beta\alpha_h + (1 - \beta)\alpha_l$ represent average add-on risk in the population and $\tilde{\alpha} \equiv \frac{\gamma\beta\alpha_h + (1-\beta)\alpha_l}{\gamma\beta + (1-\beta)}$ represent the risk among those believing

⁵The assumption of costless add-on production is made for convenience. The qualitative results do not change if add-on production costs an amount strictly less than k .

⁶Many of the restrictions placed on credit cards by the Credit CARD Act support the idea that consumers were either unable to anticipate all contingencies fully or did not believe seemingly beneficent offers were legally binding. We discuss these restrictions further in section 4.

⁷We could also include “underconfident” consumers, who are actually low risk but believe they are high risk. Their inclusion would increase the level of underconsumption and the support for regulation, but would be qualitatively similar to simply increasing the number of consumers who are high risk and aware of it. For this reason we simplify by not including them.

themselves to be low-risk. So,

$$\alpha_l \leq \tilde{\alpha} < \bar{\alpha} < \alpha_h.$$

Finally, we impose some standard limitations on the equilibria we characterize. When making their original purchase decisions, consumers have to form beliefs about the final add-on price. All consumers are Bayesian in their beliefs about prices, and we focus on perfect Bayesian equilibria of the game. We also look for symmetric equilibria in which all firms offer the same contract or set of contracts.

2.2 Market Equilibrium

The following Proposition describes the symmetric perfect Bayesian equilibria of the game. Figure 1 depicts the equilibrium outcomes for different renegeing probabilities (r) and gains from trade (G), with and without the overconfident ($\gamma > 0$).

Proposition 1. *In any symmetric perfect Bayesian equilibrium, at most two contracts are chosen:*

$$\begin{aligned} p_A^h &= 0 & p_B^h &= c - D_A r k \\ p_A^l &= k & p_B^l &= c - \tilde{\alpha} k, \end{aligned}$$

where D_A is the expected demand for the add-on in the high-risk contract, $\bar{\alpha} \leq D_A \leq \alpha_h$.

- If $G > 0$, there are two commitment cutoffs,

$$\underline{r} = \frac{\beta\gamma}{\beta\gamma + 1 - \beta} \quad \bar{r} = \frac{\gamma}{\beta\gamma + 1 - \beta}.$$

- i If $r \leq \underline{r}$, both contracts are offered. $D_A = \alpha_h$, and all consumers of type i take the contract (p_B^i, p_A^i) .
- ii If $\underline{r} < r \leq \bar{r}$ and $G \geq rk(\alpha_h - \alpha_l) - k(\tilde{\alpha} - \alpha_l)$, both contracts are offered. Some low-risk consumers take (p_B^l, p_A^l) and all high-risk consumers and the remaining low-risk consumers take (p_B^h, p_A^h) . If instead $G < rk(\alpha_h - \alpha_l) - k(\tilde{\alpha} - \alpha_l)$, only the (p_B^l, p_A^l) contract is offered. All low-risk consumers take it, and all high-risk consumers take no contract.

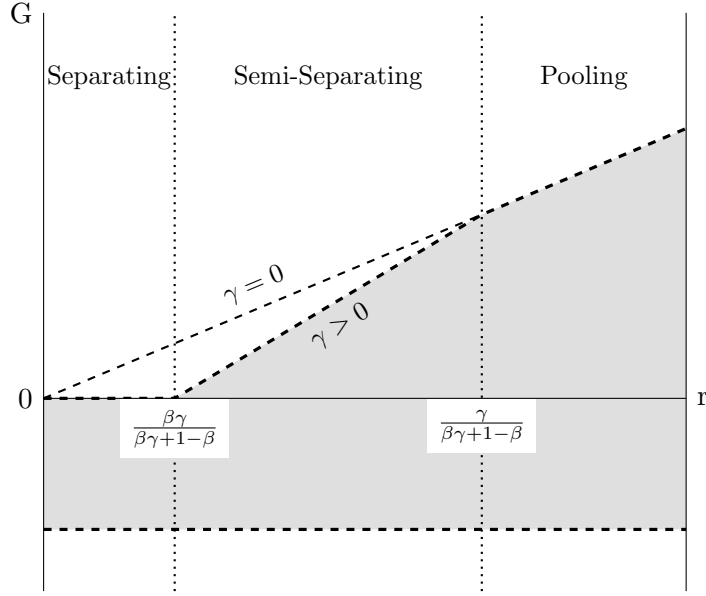


Figure 1: Equilibria Under Competition for Different Probabilities of Reneging (r) and Gains from Trade (G). High risk consumption occurs when above dashed lines (bold for $\gamma > 0$, not bold for $\gamma = 0$). In the light grey region, inefficient over- or under-consumption occurs.

iii If $r > \bar{r}$, one contract is offered. If $G \geq rk(1 - \beta)(\alpha_h - \alpha_l)$ it is (p_B^h, p_A^h) , both types buy it, and $D_A = \bar{\alpha}$. Otherwise, it is (p_B^l, p_A^l) , and only the low-risk and overconfident buy.

- *If $0 > G > -k(\bar{\alpha} - \alpha_l)$, only (p_A^l, p_B^l) is offered, and it is purchased by low risk and overconfident consumers.*

Proof. In Appendix. □

The key determinant of the equilibrium is the preference of the low-risk consumers (along with the overconfident) for either separating out with their own contract or pooling through the high-risk type's contract. As long as any commitment is possible ($r \neq 1$), firms have the capability of offering multiple contracts. Whether consumers will separate into type-specific contracts or pool on a common contract turns on the firms' commitment ability, the gains from trade, and the prevalence of the overconfident. In short, the low-risk choose between taking advantage of the overconfident to a large degree and taking advantage of both the high-risk and overconfident, but to a small degree.

Under pooling, expected add-on demand is $\bar{\alpha}$, the average risk in the population. For high-risk consumers, a high add-on price is unambiguously bad. Firms compete for these consumers by committing as best they can to low add-on prices. They offer

marginal cost pricing ($p_A = 0$), but renege on this promise with probability r . Zero profits set the base good at $p_B = C - rk\bar{\alpha}$, resulting in a positive net transfer to the low risk (since they pay the add-on with lower than average probability), and a negative net transfer from the high risk. In these contracts, the expected surplus of the high risk is $G - rk(\alpha_h - \bar{\alpha})$, which may be negative if gains from trade are low and commitment is difficult (high r). The transfer through the differential add-on risk can drive the high-risk out of the market, even though the gains from trade are positive. We refer to this inefficiency as *underconsumption*.

When separating from the high risk, the low risk want a large add-on price, and low base-good price, because this allows them the biggest transfer from the overconfident. The overconfident believe themselves to be low risk, so they prefer these riskier contracts as well. Expected add-on demand in such a contract is $\tilde{\alpha}$, the weighted average risk of needing the add-on for consumers believing themselves to be low risk. A zero-profit separating contract for the low risk, then, will have $p_A = k$ and $p_B = C - \tilde{\alpha}k$, providing them with expected surplus of $G + k(\tilde{\alpha} - \alpha_l)$. This can be positive, even when $G < 0$, so we may observe consumption despite negative gains from trade. We refer to this inefficiency as *overconsumption*.

When separated from the low risk, the high risk are indifferent between all the zero-profit contracts, but the one with the lowest possible add-on price is least likely to attract the low risk. Firms offer marginal cost pricing ($p_A = 0$) but renege on this promise with probability r . Zero profits sets the base good at $p_B = C - rk\alpha_h$. This contract leaves the full gains from trade with the high risk, but might also be attractive to the low risk. If a low-risk consumer deviated to take this contract, he would net himself expected surplus $G + rk(\alpha_h - \alpha_l)$. Efficient separating contracts break down when the low risk would prefer such a deviation. This breakdown occurs when commitment is weak, so the effective add-on price in the high-risk contract is high, or when there are very few overconfident types.

In summary, efficient separation is possible when commitment is effective or there are many overconfident consumers to take advantage of. When separation breaks down, the transfers implicit in pooling with the low risk can drive the high risk out of the market for low gains from trade, leading to underconsumption. Finally, when there are small negative gains from trade, inefficient overconsumption will occur, as the overconfident unknowingly subsidize the consumption of the low risk.

Note that all when all consumers are fully rational ($\gamma = 0$), case (iii) of the proposition obtains. Only one contract is offered. It is the most attractive for the

high risk as long as they are willing to accept it, and the most attractive to the low risk otherwise.

The two imperfections in this market, limited commitment and overconfidence, have direct effects on equilibrium outcomes, but also interact in interesting ways. The direct effect of overconfidence is to lead to overconsumption, as the overconfident subsidize the low risk's consumption. The direct effect of commitment problems is underconsumption, as the likelihood of costly add-ons, for which they are insufficiently compensated by a cheaper base good, lead the high risk to drop out of the market. Firms would like to bring them back in by offering lower-priced add-ons, but they cannot commit to such a low price. For given parameters, the presence of the overconfident actually improves the problem of underconsumption, since in many cases the low risk now prefer to separate from the overconfident, leaving the high-risk consumers in their own contract and eliminating underconsumption completely. By contrast, the problem of overconsumption is completely independent of commitment, since the firms are offering the maximum add-on price in all the overconsumption equilibria, leaving no room for renegotiation.

3 Regulation and Overconfidence

When price commitment ability is low and the gains from trade are small, competition does not lead to efficient equilibria, as either overconsumption or underconsumption often occur. It is possible to ask how different consumer types would like to affect these outcomes through regulation. Efficient regulation could solve both problems. We adopt a positive approach to regulation, in which the will of the citizens participating in the market determines the regulation imposed. Our measure of whether positive political regulation will succeed is whether (some or all) consumers prefer restrictions to the maximum add-on price that would restore efficiency to the market.

We find that when markets do not guarantee efficiency, the political process usually fails to deliver efficiency as well. The problem of overconsumption is never solved through regulation. The range of parameters for which an extant problem of underconsumption is solved through regulation is reduced by the presence of the overconfident as well. The overconfident make the market function worse in some ways and better in others, but always make regulation less likely than with Bayesian decision-makers.

3.1 Equilibrium Regulation

Consider an extension of the base model where the government enacts a price regulation prior to firms setting their prices. Rather than impose some particular political mechanism for this choice, we simply investigate the citizens' preferences over policies, and remain agnostic as to how those preferences become policy. We assume that, in calculating their political preferences, citizens are perfectly rational and self-interested, other than having potentially biased beliefs.⁸ We assume citizens are capable of correctly calculating the equilibrium impact of regulations.⁹

There is clearly scope for effective regulation in this market. A regulation which fixes the price that producers can charge for the add-on at 0 would guarantee efficiency, since both consumer types would achieve utility G , independent of their types or beliefs about their types. But even weaker caps could also be effective, and may have broader support. We will assume that regulation, if imposed, will take the form of some limitation on the price charged for add-ons.

There are several ways we could think about such a price limitation, which are substantively different but would be equivalent in the model. The first and most straightforward is a simple price cap, limiting by law the price that the firms are allowed to collect from consumers for providing the add-on. An alternative interpretation is that the regulation is some limit on market behavior that improves the consumer's outside option, decreasing k . For example, the recent Credit CARD act requires a longer notification period before any major change in terms, allowing consumers a greater opportunity to search for alternatives to paying the add-on price. A third form of regulation would be rules which make add-on price commitment easier (raising r), such as mandating simple contractual terms somehow.¹⁰ Regardless of

⁸We can think of no better benchmark than this. Citizens may be swayed by altruism, political psychology, or a deeper sort of political irrationality. But we are interested here in narrowing in on the effect of one particular behavioral bias at a time. Introducing an additional deviation from rational self-interest at the political stage would only muddy the waters. We will return, briefly, to the question of what role "outside" influences on policy might play in the conclusion.

⁹There is an apparent tension between widespread consumer mistakes about their own demand in this market and their accurate knowledge of the market equilibrium when there is a cap on prices. This tension is only apparent: it is not important that every consumer be able to calculate the equilibrium effects as long as there are industry groups, reporters, or other sources of information about the effects of regulation that consumers have access to. Nearly all newspaper articles about the Credit CARD Act, for example, mention that it could lead to increased fees and reduced rewards. This assumption is also necessary to get much interesting action in the model. If, for example, we assumed that consumers ignored the effects of capping the add-on price on the base-good price, all consumers would support capping the base good completely.

¹⁰Either type will strictly prefer regulation in the same circumstances regardless of whether it reduces k , p_A , or r . However, when low-risk consumers do not want regulation, they do not care

the form that price regulation takes, we assume it can be costlessly and perfectly enforced. This gives the greatest scope for useful regulation and is the best case for the prospects of efficiency-improving regulation. Nevertheless, such regulation has distributional impacts, often reducing cross-subsidization that benefits low-risk consumers, so it may not enjoy universal support.

Proposition 2. *Assume that before firms set prices, the government can impose regulation which caps the add-on price at $\bar{p} \leq k$. Then*

- *If $G > 0$, there are two commitment cutoffs \underline{r} and \bar{r} defined as in Proposition 1.*

i) If $r < \underline{r}$, all consumers (weakly) prefer no regulation.

ii) If $\underline{r} < r < \bar{r}$, high-risk consumers strictly prefer efficient regulation with $\bar{p} = 0$ to all other caps. Low-risk consumers strictly prefer no cap.

iii) If $\bar{r} < r$, high-risk consumers strictly prefer efficient regulation with $\bar{p} = 0$.

If

$$k\gamma(\alpha_h - \tilde{\alpha}) < G < rk(\alpha_h - \bar{\alpha}),$$

low-risk consumers prefer the highest efficient cap. Otherwise, they strictly prefer no regulation.

- *If $0 > G > -k(\tilde{\alpha} - \alpha_l)$, low-risk consumers strictly prefer no regulation ($\bar{p} = k$) and high-risk consumers are indifferent among all regulations.*

Figure 2 depicts the parameter combinations for which each type supports regulation with and without overconfident consumers.

If the high risk control policy, they will always regulate away any underconsumption. But they will also use unnecessary regulation, to limit their transfers to the low risk. Unless they receive their own separate contract, the high risk always benefit from capping the add-on price at zero whenever trade is efficient. Without overconfident consumers, the high risk never receive their own contract, so they always support regulation. In the presence of overconfident consumers, for low r , the high risk receive their own contract and are indifferent to regulation.

The low risk face a more complicated tradeoff. When there are no overconfident consumers, the low risk always support a regulation to induce the high risk to buy.

whether regulation in terms of r is imposed, but strictly prefer that the other two forms of regulation not be imposed.

They want the weakest cap that will guarantee consumption, since their transfer from the high risk is proportional to the add-on price. When there are overconfident consumers, they have another alternative to bringing the high risk into the market, and that is to simply take the maximum subsidy from the overconfident. Then, the only time they support regulation is when pooling with the high-risk is their most attractive option ($r > \bar{r}$) **and** only a very mild cap would be required to entice the high risk to consume, i.e. when the gains from trade are large, but there is nevertheless underconsumption. When the low-risk consumers control regulation, they will only rarely use it to correct inefficiency. When r and G are both high, there is a triangular region where only the low risk are consuming in which the low risk would prefer to regulate and get the high risk to consume as well. This is because both r and G are conducive to extracting cross-subsidies from the high risk without giving up too much cross-subsidization from the overconfident.

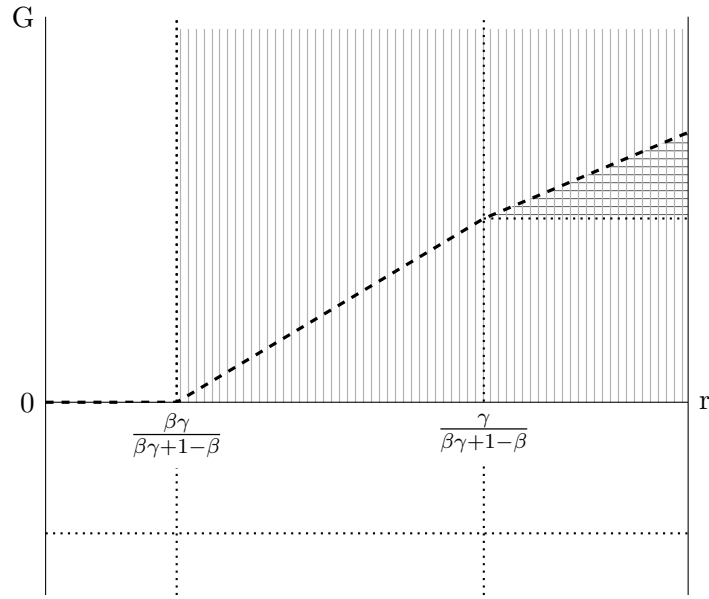
Both competition and regulation are ineffective in dealing with overconsumption. Regardless of commitment, the market never corrects the problem, and neither consumer type supports regulation when overconsumption is occurring. The high risk will not consume in this range, regardless of regulation, and the low-risk are consuming only because of subsidy from the overconfident brought about by the high add-on price.

3.2 The Role of Overconfidence in Equilibrium Regulation

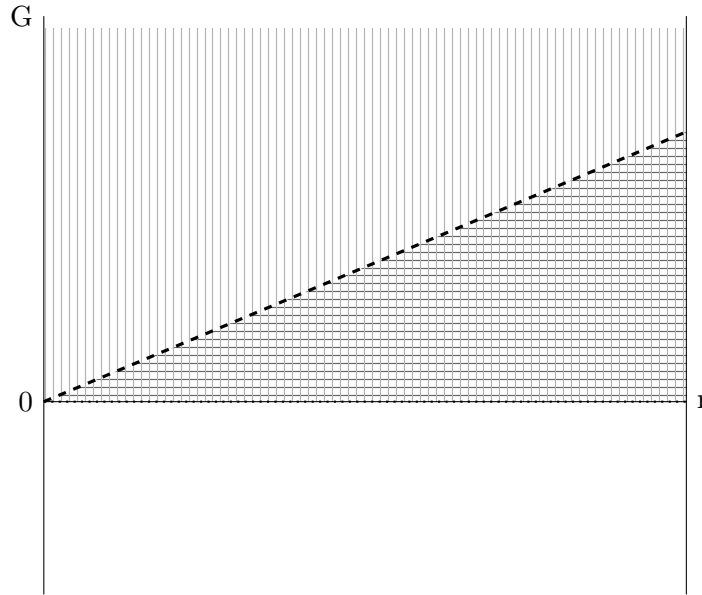
With no overconfident consumers ($\gamma = 0$), the market with regulation will be efficient, regardless of who controls policy. Regulation picks up exactly where the market fails. Underconsumption is the only inefficiency that could potentially arise in this context, because there are no overconfident consumers to subsidize the base good. The high risk will certainly support regulation to eliminate underconsumption, since they are the ones underconsuming. The low risk will also support it, since they can obtain a transfer from the high risk only if the high risk consume. The two types will differ on what efficient policy they would like enacted – the high risk always prefer for the add-on to be priced at 0, while the low risk want the highest price that does not cause the high risk to drop out of the market.

The introduction of the overconfident has four effects. First, it brings about overconsumption. There is no support for regulating away this inefficiency that has its roots in the existence of the behavioral type.

Second, competition becomes more effective at solving the problems of under-



(a) Some Overconfident Consumers ($\gamma > 0$).



(b) No Overconfident Consumers ($\gamma = 0$).

Figure 2: Demand for Regulation by High and Low Risk Consumers with and without Overconfident Consumers. Vertical shading indicates region in which high risk strictly prefer efficient regulation. Horizontal shading indicates region in which low risk strictly prefer efficient regulation.

consumption. When r is small and G is small, the low risk prefer to pool with the overconfident and let the high risk have their own contract. Without the overconfident, this is not an option, and the consequences of pooling with the low risk drive the high risk to underconsume.

Third, the presence of the overconfident reduces demand for regulation among the low risk. Before, the low risk always supported efficient regulation so they could take advantage of the high risk. Now, if ending underconsumption would require too stringent of a cap on the add-on price (as it would for high r and low G), they prefer to leave the high risk out of the market and instead take advantage of the overconfident.

Finally, as overconfidence grows, more people think they are low risk. Since the high risk always have more pro-regulation tendencies, this change can only decrease the demand for regulation in toto. In sum, introducing the overconfident into this model decreases the need for regulation in some domains (underconsumption) and increases it in others (overconsumption), and unequivocally decreases the demand for regulation throughout.

3.3 Triggers of Efficient Regulation

Despite the effects outlined above, we do see regulation sometimes enacted in markets for goods with add-ons where there is considerable evidence of consumer overconfidence. The induced preferences for regulation outlined above can be used to predict or explain when regulation of such markets will occur. Three varieties of changes in the economy shift support for the imposition of an efficient cap: changes in populations, changes in risks, and changes in underlying market structure (either payoffs or commitment). All effects are on the support for regulation to reduce underconsumption. There is never any support to regulate away overconsumption.

First, the range of parameters for which efficient regulation will be imposed grows as the fraction overconfident in the population decreases. This change happens for three reasons. First, the market becomes worse at solving the problem of underconsumption, so the high risk want regulation more often. Second, the attraction of keeping prices high to take advantage of the overconfident declines, so the low risk are more willing to support efficient regulation to bring the high risk into the market. Third, more people believe they are high risk, and the high risk always have (weakly) higher demand for regulation. This effect implies, for instance, that an education campaign that informed some overconfident consumers of their true risk of requiring the add-on might induce an increased demand for regulation.

When the fraction of high-risk consumers grows, the support for regulation that eliminates underconsumption increases. The direct effect of increasing the number of high-risk consumers is to increase the support for regulation, since the high risk always support regulation that eliminates underconsumption. The low risk also increase their support for efficient regulation, since there are now more high-risk consumers to take advantage of if those consumers can be convinced to consume. Taken together, underconsumption is less likely as an equilibrium political outcome as the fraction high risk increases. On the other hand, underconsumption occurs in market equilibrium for a smaller range of parameters as the number of high-risk consumers increase. Thus, increasing the number of high-risk types will increase the demand for regulation, given that regulation is required reduce underconsumption, but it will also reduce the need for such regulation.

Decreases in the “risk differential” ($\alpha_h - \alpha_l$) will also increase the demand for efficiency-improving regulation. Since the size of the transfer the low risk receive decreases as the risk differential shrinks, a weaker regulation (higher cap) will be required to induce consumption by the high risk, so it becomes more attractive for the low risk to cap the price to induce the high risk to consume. There is no effect on the demand for regulation among the high risk. Again, as the risk-differential shrinks underconsumption is a market equilibrium for a smaller range of other parameters. Taken together, decreasing the risk differential will increase the demand for regulation, if regulation is required to eliminate underconsumption, but it will also reduce the need for such regulation.

Gains from trade also affect the demand for regulation. For negative G , there is never any demand, but as G increases first the high risk and then the low risk come to support regulation. Once G gets big enough, the need for regulation breaks down as the market itself delivers efficiency. The high risk will still support regulation, at least for high r , but that support is about distribution and not efficiency.

Finally, the demand for regulation is always increasing as the firm’s commitment problem becomes more severe. Since the market is less and less effective as r increases, both types become (weakly) more willing to intervene as r grows. Importantly, the range of commitment problems for which the low risk are willing to support efficiency-improving regulation shrinks as the number of overconfident increase. It becomes too attractive to soak the overconfident, so they are willing to ignore the classical market imperfection rather than fix it and forgo the opportunity.

3.4 Behavioral IO and Positive Political Economy

Our analysis of the demand for regulation in a market with imperfectly rational consumers is premised on one particular model of market behavior. A large literature exists looking at different imperfections in different settings. Often these papers draw conclusions about the possibility of efficiency-improving regulation.¹¹ These models also make implicit predictions about the induced preferences for regulation of citizen-consumers, although the implications of these induced preferences for the demand for regulation are not often addressed. Below, we discuss a number of the most prominent papers in this literature. Each of them makes a (sometimes implicit) policy prescription. Only in rare exceptions with sophisticatedly biased consumers *and* an additional market imperfection would any of the modeled citizens support the welfare-maximizing regulations the authors suggest.¹² Often, but not always, this dynamic occurs because the imperfection creates winners and loser, but the losers believe they are winners.

Heidhues and Koszegi (2010) The primary regulation considered in Heidhues and Koszegi is a limitation on large penalties for deferring small payments in credit markets. This policy is welfare improving (on net), because it allows naïve consumers to better anticipate their ex-post repayment decisions. The distributional consequences of regulation depend on the assumption made about the abilities of firms to discriminate between the sophisticated and naïve consumers.

When firms are able to perfectly discriminate, both consumer types are indifferent to the regulation ex-ante, although the naïve consumers actually benefit from it ex-post (their Proposition 3). When firms are not able to discriminate, they leave some rents to the sophisticates in order to take advantage of the naïve (their Proposition 7). Ex-ante, both consumer types believe that the regulation makes them worse off, although the naïve are wrong in that belief. In fact, the regulation would create winners and losers, but everyone believes they are winners, so neither type would push for efficiency-improving regulation.

¹¹In one exception, Bubb and Kaufman (2009) consider a non-regulatory institutional solution – the introduction of non-profit firms. Since such entry could occur without the intervention of the government, we consider it a market solution, and do not discuss it here. A policy to subsidize entry by non-profits (as is often done by granting tax-exempt status), however, could fall victim to the forces we have outlined.

¹²It is certainly worthwhile to solve for the first-best regulation. Maybe regulation against the preferences of consumers is possible, say by knowledgeable, beneficent administrators. Our point is that such regulation may require acting against the expressed interest of the citizens.

Gabaix and Laibson (2006) Gabaix and Laibson (IV.B) primarily discuss regulations that would inform the myopic consumers of the existence of the add-on. Such an intervention would hurt the sophisticated consumers, who benefit from the subsidized base good. The policy preferences of the myopic consumers are not well-defined, since they simply ignore the add-on, but it is reasonable to assume that they will not demand regulation for a good that they do not know exists.

DellaVigna and Malmendier (2004) With sophisticated or time-consistent consumers, firms respond efficiently and there is no scope or demand for regulation. With partially naïve agents, there is some scope for welfare-improving regulation (Proposition 3). In perfectly competitive markets, all consumers will oppose the efficient regulation, since the equilibrium prices maximize their (biased) consumer surplus. In monopolistic markets, there may be more demand for regulation, but this is as much a classical concern with regulating a monopolist as anything related to naïveté. In fact, the most preferred regulation would be that which delivered the (inefficient) equilibrium of the perfectly-competitive environment, since that is the price combination which maximizes perceived consumer surplus.

Gottlieb (2008) The model by Gottlieb (2008) is similar to that of DellaVigna and Malmendier (2004). Demand for regulation arises due to the combination of sophisticated time-inconsistency with a second market imperfection (inability to enforce exclusive contracts). Furthermore, to the extent that consumers are naïve, they will demand inefficiently weak regulation.

4 Regulation and the Credit Card Industry

As an illustration of the ideas contained in our model, consider the market for credit cards. The credit card industry fits our model's assumptions well. There is high variation among consumers in the chance that they will incur add-on costs.¹³ Many consumers exhibit overconfidence about their repayment ability.¹⁴ Firms may be

¹³As in our model, there is considerable heterogeneity in how these add-ons impact different consumers. Stango and Zinman (2009) calculate month-to-month correlations in fees and interest costs consumers suffer. A minority of consumers pays the majority of the add-on fees.

¹⁴ Many consumers are overconfident about their ability to repay revolving credit in a timely manner. Shui and Ausubel (2005) find that most consumers, when offered either an introductory offer with a very low rate and short duration, or an offer with a higher rate and longer duration, took the shorter length offer, despite in most cases losing money because of it. Similarly, Agarwal

unable to commit fully to the price of these add-ons. Anecdotal reports of exploitative fees, interest traps, and onerous indebtedness are also common, suggesting that many consumers are unhappy with some of the industry’s practices.

The base good is the capacity to make purchases without carrying around cash or checks, combined with a line of credit. The base good price is often quite small: a fixed interest rate to be paid on balances transferred onto the card at the start or an annual fee. While the base good is inexpensive, credit cards have two varieties of optional service that each can be described as add-ons in our model. The first type of add-on is significant fees triggered by contingencies. These add-on fees can amount to hundreds of dollars per year for a few consumers (Stango and Zinman, 2009). Until recent regulation, add-on fees could be changed with little customer notification, or with notification cloaked in extremely difficult language and small print. Our model represents these ambiguous and shifting fee structures by an imperfect ability to commit and the consequence is underconsumption.

A second form of add-on is interest charges on balances. The interest charges add-on probably is easier for consumers to understand, so contains less possibility of renegeing by firms. The major problem with this second add-on from a public policy and consumer perspective is probably that some consumers take on sub-optimally large levels of debt. Our model represents this by negative gains from trade from this add-on.¹⁵

Recently U.S. Federal regulations have placed restrictions on what credit card companies can charge for these add-ons. The Credit CARD Act of 2009 prohibits many of the practices of the credit card industry that critics claimed were exploitative. Most of the changes amounted to limiting surprises about add-on fees and interest charges – the first type on add-on mentioned above. Rates can no longer increase during the first year of having the card. Very explicit notification for APR changes are mandated, and the degree of advanced notification must be at least 45 days. Universal default – the practice of increasing card users’ interest rates based on their payment records with unrelated accounts, such as utilities or other credit cards – is

et al. (2005) find that when choosing between an offer with a fee and a lower interest rate or no fee and a higher interest rate, many borrowers took the offer with no fee despite the fee offer being less costly ex post.

¹⁵ Heidhues and Koszegi (2010) find that the equilibrium contract in credit markets with hyperbolic consumers has front-loaded terms, which lead to consumer default along with the associated fees. This product of overconfidence is similar to our interest charge / overconsumption add-on. In their model, there is scope for welfare-improving regulatory interventions that limit the size of penalties, but they do not explore the demand for these regulations among the consumers.

banned.

Mandated cuts to add-on prices lead to an increase in base good prices. In a recent survey of direct mail credit card offers, the fraction of cards requiring an annual fee has increased to the highest level in a decade. Base interest rates have also markedly increased.¹⁶ The implementation of the new regulations has corresponded to a decline in rewards programs.¹⁷ Consumers who enjoyed rewards programs and were at low risk for fees were harmed by the Credit CARD Act. Historically, the credit card industry opposed the sorts of reforms implemented in the Act by warning that they would have to raise prices (increase fees or reduce rewards) in response. This tactic may explain the relative lack of regulation until this point.

The analysis in Section 3.3 suggests some plausible reasons why regulation occurred when it did. The recession of December 2007 to June 2009 may have increased the risks of credit card use for responsible consumers. In our model terms, the probability that low-risk individuals needed the add-on increased, closing the risk differential. This changing risk demographic makes cross-subsidization by the overconfident less appealing, and if the shift is large enough, it can produce a political will for efficient regulation. Second, in the same period, the riskiness of certain financial transactions became more salient. If this shift led some of the overconfident to “wise-up”, reducing γ , that would also make regulation relatively attractive. Finally, the financial turmoil could have led some consumers to move from low risk to high risk (β increasing). As more consumers are high risk, it becomes relatively attractive to the low risk to regulate add-on prices in order to keep the high risk in the market, increasing the demand for regulation to eliminate underconsumption.

The intent of the regulation in these cases is not to prevent exploitation *per se*, but rather to limit the side effects of the redistributive “technology” used to benefit the rational at the cost of the overconfident. In the new risk environment, the low risk were better off with a smaller share of the bigger pie brought about by efficient regulation. The specifics of the Credit CARD Act buttress these interpretations. With few exceptions, the provisions do not directly target consumers who would overestimate their ability to repay the revolving credit as would, for example, a cap on interest rates. The provisions make interest rates and fees more predictable, changes which benefit rational consumers more than overconfident consumers. While double-cycle billing or shifting due dates were restricted, these are add-ons which impose heavy

¹⁶“Credit card offers make a comeback to US households”, *Synovate*, Feb. 10, 2010.

¹⁷“Rewards Cardholders Face a Higher Price for Perks”, Eric Dash, *New York Times*, Feb. 19, 2010.

costs on non-overconfident consumers as well. Nearly every provision on the act is consistent with regulation to limit underconsumption brought about by commitment problems and the entire act seems completely ineffective at limiting overconsumption.

5 Conclusions and Implications

Biased consumers can cause problems in markets for themselves and for other consumers. Often, even robust competition will not suffice to correct these problems, in which case there is often scope for efficiency-improving regulation. We show that under these conditions, the biases that bring about the market imperfections can also undermine the provision of these regulations. In some circumstances, these biases can even “infect” the demand for regulations that exist to solve a problem, like market power, unrelated to the bias itself.

We establish these claims for a market with add-ons and overconfident consumers. One result is that overconfidence can give rise to overconsumption, as the overconfident subsidize inefficient consumption. A price cap on the add-on would eliminate this inefficient consumption, but such a regulation would receive no support from any consumer in the market. Everyone who might benefit from the regulation believes they will be hurt, since they all believe themselves to be the ones taking advantage of the overconfident. A second result is that overconfidence can also foster underconsumption, which arises due to a separate source, the ex-post market power of producers of the add-on good. With no overconfident types, all consumers would support a regulation to eliminate this imperfection, but the presence of the overconfident reduces demand for this regulation as well. Since the transfer from the overconfident comes via the add-on, there is a trade-off between the size of the pie and the share captured by those believing themselves to be low risk. This trade-off will reduce their demand of efficient regulation to eliminate underconsumption.

When regulation does occur, it is because the business methods used to collect rents from overconfident consumers are also harmful to rational consumers, causing the high risk to leave the market. In Section 4 we argued that recent credit card regulations seem to match this story better than an alternative story where regulation is directly intended to help biased consumers.

The fundamental point of our analysis is that regulating away inefficiencies induced by non-Bayesian consumers is unlike traditional economic regulation in an important way. In regulating an externality or monopolist, for example, there will be

winners and losers, but the total expected gains of efficient regulation to the winners will be bigger than the expected loss to the losers, so we might expect an idealized polity where everyone expresses their self-interest politically to enact the efficient regulation.¹⁸ Here, the same bias which causes the inefficiency to arise in the first place will lead the losers to miscalculate their induced preferences over policy, leading them not to push for their own best interests.

Unlike in the case of traditional economic regulation, some additional driver of policy preferences would be necessary for it to be likely that policies that “correct” problems like overconsumption will be enacted. We can think of at least three responses to this fact. First, one could try to introduce some welfare-maximizing regulator who is insulated from political pressures. But fully insulated regulators are risky – perhaps some paragon exists who would do the socially optimal thing despite it being unpopular and having full discretion, but it would be naive to think we could identify them, since those who act in their own self-interest will have a much stronger incentive to seek the job. Furthermore, this response only pushes the problem back a level – if there is limited support for the socially efficient policy, why should there be support for creating a regulator who would implement it?

An alternative driver would be the presence of some other-regarding preferences. A small amount of altruism might suffice to induce some support for efficient regulation, especially in the case of overconsumption. In the case of overconsumption, there is a mass of high-risk individuals who are indifferent among all price caps. If they put some stock in the payoffs of the other members of society, they would have a strict preference for an efficient cap, since the net cost to the overconfident outweighs the net benefits to the low risk. If the high risk are pivotal, they could drive the implementation of policy. Introducing mild altruism will increase support for the elimination of overconsumption, but will do little to the second effect where the overconfident lessen support for regulating underconsumption. The reason is that all parties already have strong, and opposed, self-regarding preferences in that instance. To alter this dynamic, the altruistic instinct would have to be so strong as to overwhelm the low risk’s own self-interest, a much stronger force than would be required to simply nudge the high risk out of their indifference.

¹⁸We do not want to overstate the efficiency of the political process. It is fraught with rent-seeking. Not all groups are equally organized, and there are plenty of examples of inefficient traditional economic regulation. Our point is that, abstracting away from all the problems with politics, the pressure should be there to do the efficient thing. After all, this is the very definition of dead-weight loss.

Finally, a third response to this persistent inefficiency may simply be to accept it. Perhaps some behavioral biases are best seen as technical constraints that limit the feasible set of economical/political outcomes, and not as a problem amenable to solution.

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A Proofs

A.1 Proof of Proposition 1

Separating: If r is low enough, firms can offer two contracts that fully separate the low and the high risk. They will offer contracts that maximize the utility of each type, conditional on making non-negative profits. With overconfident consumers, low-risk consumers believe they maximize their utility with as high an add-on price as possible, and high-risk consumers maximize their utility with as low an add-on price as possible. Each type i gets a contract that hews as close to those preferences as possible:

$$\begin{aligned} E[p_A^H] &= rk & p_B^H &= c - \alpha_h E[p_A^H] \\ E[p_A^L] &= k & p_B^L &= c - \tilde{\alpha} E[p_A^L] \end{aligned}$$

Semi-separating: As r increases, a fully separating equilibrium eventually no longer exists, as low-risk consumers prefer to take the high-risk contract. Low risk get the following payoffs under either contract:

$$\begin{aligned} U_L(L) &= 1 - (c - \tilde{\alpha})E[p_A^L] - \alpha_l E[p_A^L] = G + k(\tilde{\alpha} - \alpha_l) = G + \frac{\beta\gamma(\alpha_h - \alpha_l)k}{\beta\gamma + 1 - \beta} \\ U_L(H) &= 1 - (c - \alpha_h)E[p_A^L] - \alpha_l E[p_A^L] = G + (\alpha_h - \alpha_l)rk \end{aligned}$$

Comparing these shows that some low-risk consumers want to switch contracts once

$$r \geq \frac{\beta\gamma}{\beta\gamma + 1 - \beta}.$$

Enough low-risk consumers switch to make $U_L(L) = U_L(H)$. Let $\hat{\alpha}$ be the expected add-on demand from consumers who choose the H contract.

$$U_L(H) = G + (\hat{\alpha} - \alpha_l)rk = U_L(L) = G + (\tilde{\alpha} - \alpha_l)k$$

so

$$\hat{\alpha} = \frac{1}{r}(\tilde{\alpha} - \alpha_l) + \alpha_l.$$

High-risk consumers will still take the H contract as long as

$$G \geq k(\tilde{\alpha} - \alpha_l) - rk(\alpha_h - \alpha_l).$$

If this equation is not satisfied, then the high risk will not consume, as the H contract is the most attractive contract for the high risk that is possible.

Pooling: That condition assumes that r is in the intermediate region where there is a semi-separating equilibrium in which some low risk are taking each contract. If r is high enough, however, all of the low risk will prefer the H contract. This will happen if no low risk consumers prefer their own contract

$$G + (\tilde{\alpha} - \alpha_l)k < G + (\bar{\alpha} - \alpha_l)rk$$

or

$$r > \frac{\gamma}{\beta\gamma + 1 - \beta}.$$

In this case the high risk will buy if

$$U_H(H) = 1 - p_B - \alpha_h p_A = G - (\alpha_h - \alpha_l)(1 - \beta)E[p_A] \geq 0$$

The expected add-on price is $E[p_A] = rk$, so if

$$G \geq (\alpha_h - \alpha_l)(1 - \beta)rk,$$

buying the base good is worthwhile for the high risk. If the high risk are not participating in the market, the low risk will be offered a riskier contract.

Negative gains from trade: The high risk never achieve utility greater than G , so they do not consume. The low risk and overconfident believe their utility to be $U_L(L)$ above, so they consume as long as $G > -k(\tilde{\alpha} - \alpha_l)$. \square

A.2 Proof of Proposition 2

The preference of high-risk consumers for efficient regulation is obvious, as is their indifference to regulation and the low risks' strict preference against regulation in the context of overconsumption. The only thing to check when the low-risk consumers prefer to regulate to eliminate underconsumption.

As we saw in the proof above, the firms will compete the add-on price down to its minimal level in any pooling equilibrium. When the add-on price is capped at \bar{p} , the expected add-on price is $E[p_A] = r\bar{p}$. When the low risk consume in a a pool with the high risk, and the add-on price is capped at \bar{p} , the high risk receive an expected payoff

$$G - r\bar{p}(1 - \beta)(\alpha_h - \alpha_l).$$

That payoff suffices to induce the high risk to consume if $\bar{p} \leq G/r(1 - \beta)(\alpha_h - \alpha_l)$. Since the low risk receive transfers propositional to the size of the add-on price, that is exactly the cap they would set. At this maximum feasible add-on price, the low-risk receive payoff

$$G + r\bar{p}\beta(\alpha_h - \alpha_l) = G + G\frac{\beta}{1 - \beta}.$$

This exceeds their payoff to pooling with the overconfident, derived above, when

$$G > \frac{k(1-\beta)(\alpha_h - \alpha_l)\gamma}{\beta\gamma + 1 - \beta} = k\gamma(\alpha_h - \tilde{\alpha}).$$

The only time G satisfies this condition and underconsumption is occurring in the unregulated equilibrium is when $r \geq \bar{r}$. \square