

3 Deception and Consumer Protection in Competitive Markets*

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3.1 Introduction

This paper discusses and extends some of our recent work on competitive markets in which consumers systematically misunderstand either their own behavior, or contract or product features. In Section 2, we briefly introduce evidence that consumers indeed systematically mispredict their own future behavior as well as the abundance of evidence that consumers misunderstand certain contract or product features. Recent research in behavioral economics emphasizes that these consumer mispredictions allow firms to charge an unexpectedly high price at an ex-post stage after consumers already have entered a relationship with the firm (DellaVigna and Malmendier 2006, DellaVigna and Malmendier 2004, Gabaix and Laibson 2006, Heidhues and Köszegi 2010). At the same time, however, researchers have pointed out that competition for such naive consumers will return much of the ex-post profits to consumers, thereby limiting or sometimes even eliminating the harm

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to consumers and inefficiency (DellaVigna and Malmendier 2004, Gabaix and Laibson 2006, Laibson and Yariv 2007). Intuitively, if a consumer's misperception allows firms to offer contracts that exploit these, such a consumer becomes a highly valuable customer. In competitive environments, therefore, firms should compete fiercely to attract such consumers, and when doing so offer very attractive deals to these consumers.¹ Based partly on related intuitions, competition policy practitioners often argue that competition policy is the best form of consumer protection. In this paper we point out severe limitations to this "safety-in-markets" argument, and emphasize that there is a potential role for active consumer-protection policies.

Based on Heidhues and Köszegi (2010), Section 3.3 highlights a first important limitation of the safety-in-markets argument in an environment in which competition drives firms' profits to zero. In our competitive environment, profit-maximizing firms offer contracts that fully exploit consumers' time-inconsistency whenever—in line with the evidence cited in Section 3.2.1—they underestimate their time-inconsistency. Indeed, whenever some consumers underestimate their time-inconsistency by an arbitrarily small amount, firms design contracts such that these consumers considerably underestimate their cost of credit, which results in excessive consumer indebtedness. This model matches seemingly surprising contract features in the US-credit market, and restricting the contractual form in ways that makes such exploitation harder hence increases welfare. Building on the model's predictions, we briefly discuss why we believe that the emphasis on "libertarian" or

¹ A close analogue is the central prediction in the switching-cost literature that although firms can exploit locked-in consumers' switching costs to generate ex-post profits, these profits tend to be partially or fully returned to consumers through the ex-ante competition for them (Farrell and Klemperer 2007).

"asymmetric" paternalism can be misguided, and suggest that it may be more appropriate to focus on "robust paternalistic" approaches. Following this approach, we derive some implications of our model for possible consumer-protection regulations such as the US Credit CARD Act 2009 and the 2008 amendments by the Federal Reserve Board to the Truth in Lending Act.

We then turn to another limitation of the safety-in-markets argument. Essentially, we argue that in many important economic settings—such as retail finance—in which the misunderstanding of contract terms is widespread, the argument that ex-ante competition should lead firms to hand back ex-post profits is overly optimistic. To do so, in Section 3.4 we introduce a novel market model for a homogeneous good in which firms compete by offering contracts that have an observable and an unobservable price component. Naive consumers ignore the unobservable price component when making their purchase decision. Besides these naive customers, however, there are arbitrageurs who have no interest in the product but who are interested in "easy money". These arbitrageurs have a given cost of avoiding the hidden fees, which is relatively easy in many real-world settings for customers who are not interested in the service whatsoever. Absent arbitrageurs, there is complete safety in markets in our model, as the unexpected ex-post profits firms earn from consumers are handed back ex ante—although each individual consumer will find that his contract offer was deceiving in that his ex-post payments are far higher than anticipated.² If there are enough such arbitrageurs, on the other hand, firms will not be

² When consumers' valuations for the product are heterogeneous, however, there will typically be some marginal consumer types who buy the product only because they believe it's less expensive than it is. From a regulatory perspective, nevertheless, it is important to note that even considerable consumer misunderstanding of contract terms in itself does not imply a high welfare cost thereof when the demand is inelastic.

willing to lower the up-front price to a level at which it becomes profitable for arbitrageurs to accept the contract and avoid the hidden fees. In essence this creates a price floor, and in the presence of this price floor firms make positive profits even in seemingly competitive environments.

Based on the idea that in most retail-finance markets the threat of arbitrageurs severely limits any up-front payments to consumers, we suggest that it is important to investigate the implications of such price floors for competition and regulation. To take an important regulatory example, lowering the additional (hidden) prices that firms can charge leads to a direct benefit to consumer in the presence of binding up-front price floors. This provides a strong counterargument against the common criticism that the cost of consumer protection measures are simply passed on to consumers.³ Nevertheless, we also point out that regulating additional prices—such as regulating the ATM withdrawal fees—can have unintended consequences—such as lowering the density of ATM machines.

Section 3.5 mentions further limitations to the safety-in-markets argument derived in other behavioral-economics papers, highlighting that there is a potential for consumer-protection policies. It also, however, mentions some pitfalls of different consumer-protection policies—such as regulating add-on prices, providing information, or increasing comparability between products. It concludes that all forms of regulations have cost and

³ Recall that Section 3.3 already establishes that—even absent an up-front price floor—this argument fails in perfectly competitive market with time-inconsistent consumers who are not perfectly sophisticated. Moreover in any environment in which consumers become aware of (some) high additional prices during the duration of the contract, and adjust their behavior to avoid these, this has adverse welfare consequences even if firms do not make positive profits from exploiting consumers.

benefits and their desirability has to be accessed on a case-by-case basis.

3.2 Evidence on Consumer Misperceptions

3.2.1 Misprediction of Own Behavior Given Contract Terms

Classic economists believed that people know their own preferences well—at least once they had a chance to learn and experience what they like. Popular wisdom and psychologists have been critical of this assertion. Think of the famous proverb "Don't go shopping on an empty stomach," warning you of buying excessive amounts of food when hungry presumably because you overestimate your demand for food in a hungry state. Experimental evidence in various domains—including preferences for food or sexual activity—shows that people on average indeed underestimate how much their preference changes in situations in which even an outside observer can predict this preference change.⁴ Behavioral

⁴ For example, Read and van Leeuwen (1998) provide experimental evidence indicating that people systematically misestimate their future food preferences. They document that hungry subjects tend to prefer unhealthier snacks to healthier items, while satiated subjects have a tendency to prefer the healthier items. And when predicting what they want tomorrow, hungry people underappreciate that they will predictably prefer the healthier snack when satiated. Similarly, Ariely and Loewenstein (2005) document that when not being sexually aroused, young males underestimate their willingness to engage in various sexual practices when being aroused. In both domains subjects presumably had ample time to learn their preferences, suggesting that misestimation of preferences is widespread.

economists have started to model these phenomena,⁵ and ask what implications it has in different economic settings.

One important setting in which mispredictions of preferences has been extensively studied is that of intertemporal choice. Many people have a preference for immediate gratification—e.g. "today wanting to start a diet tomorrow, but when tomorrow comes preferring to start the diet a day later"—and experimental as well as field evidence suggest that they underestimate their future taste for immediate gratification.⁶ In a well-known and well-documented example, DellaVigna and Malmendier (2006) find that most exercise "enthusiasts" who buy an expensive gym membership hardly use the membership. Furthermore, they forcefully argue that the most plausible explanation for such behavior lies in naive predictions of future tastes from time-inconsistent consumers.⁷

Since we focus on consumer-protection regulation in credit markets below, it is worth emphasizing that numerous papers suggest that partially-naive time-inconsistent behavior of borrowers is important for understanding this market. Meier and Sprenger (2010) report a positive correlation between low and middle-income

⁵ See Loewenstein, O'Donoghue and Rabin (2003) for a formal model and DellaVigna (2009) for a discussion of related field evidence.

⁶ For evidence of time-inconsistency and partial naivete about this time-inconsistency in different domains, see Frederick, Loewenstein and O'Donoghue (2002) and DellaVigna (2009).

⁷ In a related field study with a different subject pool, Nardotto (2011) shows that subjects choosing an overly expensive gym-membership contract instead of paying per visit are overoptimistic both about their own future and past attendance. The latter fact is in line with his finding that experience has only a small effect on improving these subjects' contract choices.

individuals who exhibit time-inconsistency in experimental choices over monetary payments and their outstanding credit-card debt. To explain a typical US household's simultaneous holdings of substantial illiquid wealth and credit-card debt, Laibson, Repetto, and Tobacman (2007) argue that the household's short-term discount rate must be higher than the long-term discount rate. Because in their calibration having a credit card lowers utility for many households, the fact that these households own these cards suggests some (partial) naivete about future credit-card use. In line with this argument, consumers overrespond to the introductory "teaser" rates in credit-card solicitations relative to the length of the introductory period (Shui and Ausubel 2004) and the post-introductory interest rate (Ausubel 1999), indicating that they eventually borrow more than they originally intended or expected to. While the majority of payday borrowers default on a loan, Skiba and Tobacman (2008) document that they do so only after paying significant costs to service their debt. Their calibrations indicate that such costly delay in default is also only consistent with partially-naive time-inconsistency. We now turn to misunderstanding of contracts or product features.

3.2.2 Misunderstanding of Contract Terms or Product Characteristics

That consumers' understanding of certain product characteristics—such as add-on prices and financial service fees—is severely limited and often systematically biased has been documented for a variety of industries. In an early paper, Hall (1997) reports that 97% of buyers do not know the price of the cartridge when buying, and in a survey by UK's Office of Fair Trading, retailers believed 75% of consumers did not have an idea about

printing costs.⁸ Boardman (2010) lists many common misunderstandings about insurance coverage; according to a survey by the National Association of Insurance Commissioners she cites, for example, 68% of consumers incorrectly believe homeowner insurance covers cars, boats, and motorcycles lost or stolen on the property. In retail banking, most consumers (including long-time consumers) do not know specific fees associated with their bank accounts, even when they claim that they do (Cruickshank 2000, pages 126-7), and probably as a result they incur many avoidable fees (Stango and Zinman 2009). In the credit-card industry, evidence by Agarwal, Driscoll, Gabaix and Laibson (2008) indicates that many consumers (especially young consumers) seem to not know or forget about various fees issuers impose. In the mortgage industry, Cruickshank (2000, page 127-8) reports that most consumers do not understand key mortgage features, and Woodward and Hall (2010) find that borrowers underestimate broker compensation. And in the cellphone industry, regulators are worried about the "bill shock" many consumers face when they run up charges they did not anticipate (Federal Communication Commission 2010).

3.3 Naivete about Self-Control in a Competitive Credit Market

In this section, we study the implications of partially-naive time-inconsistent borrowers for the functioning of credit markets. To do so, we abstract completely from consumer misunderstanding of contracts terms.

Consider the basic credit-market model of Heidhues and Köszegi (2010). There are three periods. Consumer borrow a given amount c in the initial period 0 in which they select a credit contract.

⁸ "Consumer IT Goods and Services", The Office of Fair Trading, 2002.

Thereafter they repay amounts q and r in periods 1 and 2, respectively. The self-0 incarnation, which selects the credit contract, has preferences $c - k(q) - k(r)$, where the differentiable repayment cost function k is increasing and convex, and has a slope at zero that is low enough so that consumers demand credit in the competitive industry equilibrium. Self 1 maximizes $k(q) - \beta k(r)$, where following Laibson (1997) $\beta < 1$ captures the borrower's degree of time-inconsistency. To reflect the fact that it often requires immediate time and effort to sign a credit contract,⁹ while the consumption benefits of extra credit are delayed, the model assumes that self 0 does not down weight future repayment costs in the same way that self 1 does.

For the sake of argument, assume the technically simplest form of partial naivete: self 0 believes with probability one that she down weights future consumption using $\hat{\beta} \geq \beta$. When $\hat{\beta} = \beta$, the agent is fully sophisticated and when $\hat{\beta} = 1$ the agent is fully naive, i.e. believes that her future self will have the same preferences as self 0 does.¹⁰ Furthermore, suppose that firms observe both β as well as $\hat{\beta}$.

These consumers interact with profit-maximizing risk-neutral firms that face an interest rate of zero. These firms offer exclusive credit contracts in period 0, and there is no possibility of default in the model. In addition, here we restrict attention to the simplest case in which firms observe both β and $\hat{\beta}$. In an unrestricted market, a

⁹ This is obvious for a mortgage contract but even for credit cards a significant amount of the spending is on future consumption—such as holidays or purchases of durables.

¹⁰ The paper allows for a general form of naivete in which self 0 has a distribution over β and shows that the result holds qualitatively for any such distribution in which the agents is overoptimistic in the sense of putting non-trivial probability weight on having more self control than she actually does.

general contract consists of an amount of consumption c and possibly different repayment options $\{(q_s, r_s)\}_{s \in S}$ from which the borrower can select in period 1. A repayment option (q_s, r_s) specifies the amount the agent repays in period 1 and the amount she repays in period 2. Observe that a firm can thus offer a contract with a single repayment option, which enables a time-inconsistent consumer to perfectly commit her future repayment behavior, and thereby to fully overcome any self-control problem she may have.

It is instructive to first solve a benchmark in which all borrowers are time-inconsistent but fully sophisticated $\hat{\beta} > \beta$. In this case the credit contract in a competitive equilibrium has a single relevant repayment option the consumer both thinks she will choose and that she will choose in the end; this repayment option satisfies $k'(q) - k'(r) = 1$ and the consumption amount $c = q + r$. With fully sophisticated consumers, thus, the market equilibrium maximizes self O 's utility subject to the constraint that the amount of money loaned is equal to the repayment. Intuitively, a fully sophisticated consumer cannot be fooled, and hence if her self-0 utility was not maximized, a firm could offer a contract that does so, and charge a small amount for it. This, however, contradicts the fact that firms must earn zero profits in a competitive equilibrium. Hence, the ability to commit allows a fully sophisticated consumer to overcome her self-control problem.

Now suppose instead that the consumer is not fully sophisticated and is overoptimistic about her future self-control regarding repayment $\hat{\beta} = \beta$. In this case the competitive-market equilibrium contract has a front-loaded decoy repayment option (\hat{q}, \hat{r}) the consumer think she will choose, and a repayment option (q, r) she will actually choose. The repayment option she will actually choose satisfies $k'(q) = \beta k'(r)$. In other words, it caters entirely to self 1's taste for immediate gratification, and thus the ability to write long-term contracts does not mitigate the the consumer's time-inconsistency at all. Intuitively, in the optimal contract the consumer's self 1 is indifferent in period one between choosing the front-loaded

decoy repayment option (\hat{q}, \hat{r}) and the actual repayment option (q, r) . But then any consumer with a smaller taste for immediate gratification— no matter how much smaller—strictly prefers to repay according to the front-loaded repayment option (\hat{q}, \hat{r}) , and since a non-sophisticated consumer ($\hat{\beta} > \beta$) believes to be at least somewhat less time-inconsistent when signing the contract, she believes she will repay early. Furthermore, once the firm induces the consumer to switch away from the decoy repayment option, how much the firm can charge for the consumer's willingness to delay repayment depends entirely on self 1's preference, and hence the firm designs the actual repayment option with self 1 in mind. Finally, in our extreme example in which all consumers are non-sophisticated, the decoy repayment option is never paid, and hence the firm designs this repayment option with the aim of attracting consumers in a way that does not interfere with its ability to earn unanticipated ex-post profits from these consumers. For the ability to attract the consumer, only the perceived overall repayment cost from the decoy repayment option matter, and for any given such cost the firm can make the most profits ex post if the repayment option forces the consumer to repay the entire loan in the first period. In this case, the consumer misestimates her willingness to pay for delaying repayment the most, and hence the actual repayments the firm can collect exceed the estimated ones by the most.

The competitive equilibrium not only does not mitigate the consumer's time-inconsistency, under a mild condition on the consumer's preferences it induces her in addition to borrow too much: since the consumer believes she will repay quickly, she underestimates the cost of credit, and borrows too much even given that repayment is performed according to self 1's taste for immediate gratification.

For a moment, consider a thought experiment with the sole purpose of shedding some light on why we think the focus on libertarian¹¹ or asymmetric¹² paternalism can be misguided. Suppose there is a policy maker in a world in which long-term contracts are infeasible—that is any loan must be a one-period loan in a setting that is otherwise identical to the one above. This policy maker now considers a policy intervention that allows for long-term contracts. He considers two types of consumers, classical (time-consistent) ones and non-classical time-inconsistent ones who are fully sophisticated.¹³ Now allowing long-term contracts here would not affect the welfare of time-consistent consumers, and it would make fully sophisticated consumers better off, thereby satisfying this property of libertarian paternalism. But it does harm to other, non-classical consumers: those with a $\hat{\beta}$ close to but greater than β . For $\hat{\beta}$ sufficiently close to β , these consumers believe they will repay in a way that closely resembles their actual repayment behavior in a short-term market.

In a long-term market, however, they significantly underestimate the cost of credit as they believe they will repay using the decoy option, and this lowers their welfare relative to a short-term market in which they are more careful when borrowing in the initial period. This example is meant to highlight that often it is

¹¹ See Sunstein and Thaler (2003).

¹² See Camerer, Issacharoff, Loewenstein, O'Donoghue and Rabin (2003).

¹³ Asymmetric and libertarian paternalism ask policy makers—among other things—to focus on interventions that help non-rational consumers without hurting rational consumers. While we view time-consistency and rationality to be two fully separate issues, the example is meant to capture the spirit of not hurting classic "fully rational" consumers and helping "behavioral" or non-classic consumers. Libertarian paternalism in addition requires the policy maker to not reduce the consumers' choice sets.

important to think about the unintended consequence of interventions not only on rational consumers but also on other "irrational" consumers that are likely to be present in the market place. Paternalistic interventions should be—as much as possible—robust to the existence of plausible other types of consumers.

Prior to recent regulatory intervention limiting fines for delaying repayment in various ways, the above predictions of front-loaded repayment terms, and hefty fines for delaying repayment matched features of the US subprime mortgage as well as the US credit-card market well. In addition, we are unaware of an alternative "rational" explanation for these, and argue in Heidhues and Köszegi (2010) that natural models of consumer-credit markets with fully rational consumers do not predict these contract features. We also are unaware of and see no obvious "behavioral" explanation in which these hefty fines for changing one's mind a little serve a useful economic purpose. The combination of these facts together with the potentially high welfare cost we predict, makes it natural to ask whether consumer-protection policies can lower these welfare costs.

We thus consider possible regulatory interventions in the above market with the aim of increasing consumers' welfare. In line with much of the literature, we focus on self 0's preferences for welfare comparisons. One regulation in the above model would be to simply require firms to only offer the welfare-maximizing contract. For obvious reasons this, however, is not a feasible regulation in settings in which this contract is unknown to the regulator. Similarly, in our simple setup one could require full commitment to the repayment terms; again, however, in slightly more complicated environments in which there are shocks to the consumers' repayment costs such a regulation is suboptimal. We also ignore policies that try to make contracts short term, both because they hurt sophisticated time-inconsistent consumers and because we view the long-term nature as resulting from actual consumer switching behavior, which as documented by Ausubel (1999) often ignores beneficial refinancing

options. Instead, our aim is to consider regulator interventions that seem feasible in practice.

One such regulation is to prohibit large penalties for deferring small amounts of repayment to the second period—akin to recent regulation in the US subprime market, and recent regulation in the US credit-card market that prohibits the use of interest charges for partial balances that have been payed off. Formally, we model this regulation as requiring firms to set an interest rate that consumers pay for delaying repayment from period 1 to period 2. This ensures that consumers who misestimate their time-inconsistency by only a little bit, misestimate their resulting repayment behavior and costs only slightly, and hence are almost as well off as a sophisticated consumer with the same contract. Since sophisticated consumers are offered a contract with a high interest rate for delaying repayment from period 1 to period 2, whose cost for delaying exactly offsets self's taste for immediate gratification, they receive the first-best outcome also in such a restricted market. And because nearly sophisticated consumers get a contract that is nearly optimal, they are strictly better off with such a regulation of the contractual form.

When allowing for fully-sophisticated and non-sophisticated consumers with the same beliefs, however, the above regulation does not satisfy the property of both libertarian and asymmetric paternalism that it helps non-sophisticated consumers without hurting fully sophisticated ones. In such an environment firms earn profits from non-sophisticated consumers *ex post*, and since they cannot differentiate these non-sophisticated consumers from sophisticated ones *ex ante*, competition forces firms to distribute these *ex-post* profits among all consumers *ex ante*. To observe why we think this requirement of libertarian paternalism is too stringent in our setting, consider as a thought experiment a policy that could costlessly transform all non-sophisticated consumers to sophisticated

ones. This policy, although ensuring that the welfare-maximizing contracts are selected by all consumers, would also fail the above requirement of asymmetric paternalism.¹⁴ Nevertheless, we think of such a policy as highly desirable. We thus replace this requirement of libertarian paternalism by what we refer to as *robust paternalism*: robust paternalism increases welfare independent of the exact population share of sophisticated as well as non-sophisticated consumers. Because the above policy intervention can lead to large welfare gains to non-sophisticated consumers who are almost sophisticated, it typically will increase total welfare and we therefore think of it as presumably desirable.¹⁵

3.4 Price-Competition with Naive Consumers and Arbitrageurs

In this section, we introduce our model of a market with shrouded attributes and the possibility of arbitrage. We begin by formulating an extremely stylized model of competition with shrouding that generates logic of ex-ante competition for ex-post

¹⁴ Note that in a classic competition-policy setting, a market intervention that increases total welfare or consumer surplus through eliminating a distortion is typically considered desirable at least as long as there are no obviously undesirable and severe distributional consequences. We think of eliminating this distortion in credit-markets as equally desirable.

¹⁵ The policy intervention will hurt overpessimistic consumers for whom ($\hat{\beta} < \beta$) but—at least for near sophisticated consumers—by less than it helps overoptimistic consumers. Since research suggests that overoptimism is the more widespread phenomena, and since welfare improvement for overoptimistic consumers is large, we nevertheless believe this is likely to be a beneficial intervention even though with regard to overpessimistic consumers it is not a robust paternalistic intervention.

profits similar to DellaVigna and Malmendier (2004), Gabaix and Laibson (2006), and Laibson and Yariv (2007). Our model builds on an idea mentioned in Farrell and Klemperer (2007) and Grubb (2011) and modeled in a duopoly setting by Ellison (2005), that the ex-ante price competition for consumers could be weakened because cutting prices would attract disproportionately many less profitable consumers. We go beyond previous models and intuitions by showing that the adverse-selection problem facing firms can be so severe that Bertrand-type competition yields positive profits.

Naive consumers are looking to buy a product. The consumers' value of the product is $v > 0$. There are $N \geq 2$ homogeneous firms competing in the market, and the product costs $c \geq 0$ for the firms to provide. The firms are engaged in Bertrand-type price competition, so each firm n simultaneously sets an up-front fee f_n and an additional price a_n . While naive consumers see all up-front prices f_n , they ignore the additional prices a_n when deciding from which firm to purchase. Since consumers are naive and do not take the additional price component a_n into account when selecting the firm from which they want to purchase, firms will charge the maximal additional price they can. For brevity, we thus assume that the additional price is exogenously given and equal to $\bar{a} > 0$, which can be interpreted as either a regulatory price cap on hidden charges or naive consumers' willingness to pay for continuing the service once they signed an initial contract. We also suppose that firms cannot educate consumers about the existence of the additional price.¹⁶ If

¹⁶ We have characterized equilibria in the combined model with both arbitrageurs and the possibility of educating consumers via "unshrouding the additional price" along the lines discussed in Heidhues, Köszegi and Murooka (in preparation), and the results are available upon request. The combined model yields no qualitatively new insights beyond those derived in both models separately.

consumers are indifferent between firms, the firms get equal market share.

The key assumption in addition to the existence of naive consumers is that there are also "arbitrageurs" in the market. Arbitrageurs do not derive any value from the product itself, but they are willing to take it to get free money or perks, and they can avoid paying the additional price. Let e be the cost of arbitrage, which could represent the cost of getting the product or the cost of avoiding the additional price. We think of e as often being very low, or even zero (if arbitrageurs really do not want the service at all). In fact, e could be negative either because the base product can be sold on a secondary market (e.g. a mobile phone), or because it has an alternative use which arbitrageurs value and which costs e on the market (e.g. a video-game console that can be used to watch DVD's, or a product that can be disassembled to yield valuable parts). From a formal point of view, the arbitrageurs in our model are identical to sophisticated consumers who, as in the model of Gabaix and Laibson (2006), correctly anticipate additional prices and have an effort cost e of avoiding them. Precisely, when firms set equilibrium up-front prices less than their marginal cost in the model of Gabaix and Laibson (2006), sophisticated consumers in their model work as arbitrageurs and the firms may earn positive profits in homogeneous-product price competition.¹⁷ Nevertheless, we refer to these unprofitable consumers as arbitrageurs because the threat of individuals trying to make easy money on firms seems more powerful than the threat of consumers who are able to figure out the lowest-cost way of using the product.

The proportion of naive consumers in the population is a . In many economically relevant situations, a is likely to be low for at

¹⁷ This observation has been made independently by Ko (2011) who analyses different regulatory interventions in a Gabaix-Laibson-type model.

least two possible reasons. First, in many cases the number of potential consumers for a particular service is much lower than the number of people interested in obtaining easy money. Second, this is especially so if arbitrageurs can buy multiple items whereas consumers just want one item. For an extreme example, this is the case when a good that is easy to dispose of in bulk is sold at a negative price. To ensure that firms can profitably sell the product and to ease the exposition, we assume $c < v + (N - \alpha)\alpha\bar{a}/(N - 1)$. If the share of naive consumers is very small $\alpha \approx 0$, this condition simplifies to the usual one that $c < v$. If the share of naive consumers is large ($\alpha \approx 1$), on the other hand, this simplifies to $c < v + \bar{a}$. The market in this case may only exist because naive consumers underestimate the amount they end up paying when deciding to purchase.

Proposition 1 characterizes the possible equilibria in this model.¹⁸

Proposition 1 (Equilibrium in the Presence of Arbitrageurs).

I. If $\bar{a} > e + c$ and $\alpha\bar{a} < e + c$, then there is a unique Nash equilibrium which is symmetric and in which $f = -e$, arbitrageurs do not enter the market, and firms earn positive profits.

II. If $\bar{a} > e + c$ and $\alpha\bar{a} > (N - \alpha)(e + c)/(N - 1)$, there is a unique symmetric Nash equilibrium, in which $f = c - \alpha\bar{a}$, arbitrageurs enter the market, and firms earn zero profits.

III. If $\bar{a} > e + c$ and $(N - \alpha)(e + c)/(N - 1) > \alpha\bar{a} > e + c$, there are two symmetric Nash equilibria, given by parts I and II above.

¹⁸ For simplicity, the proposition states only the symmetric equilibria in Cases II-IV. For the same reasons as in a standard Bertrand model with more than two firms, when equilibrium profits are zero there exist multiple equilibria, but which of these equilibria affects neither firm profits nor consumer welfare.

IV. If $\bar{a} \leq e + c$, there is a unique symmetric Nash equilibrium in which $f = c - \bar{a}$, arbitrageurs do not enter the market, and firms earn zero profits.

Proof. We first derive the existence of Nash equilibria in each case, and then show that the equilibrium is unique in Case I, and no other symmetric Nash equilibria exist in Cases II-IV.

First, we focus on symmetric pure-strategy Nash equilibria and prove the existence of the above equilibria in each case. A pure strategy corresponds to choosing an up-front fee f . We show that naive consumers buy the product in any symmetric pure-strategy equilibrium outcome. We prove this by contradiction. First, suppose that there exists an equilibrium such that only arbitrageurs buy the product. Then, usual Bertrand-type price-competition arguments imply that $f = c$ and firms earn zero profits. If a firm deviates and sets its up-front price slightly above $f' = c - \alpha\bar{a}$, however, it attracts both naive consumers and arbitrageurs and earns positive profits— a contradiction. Second, suppose that there exists an equilibrium in which no one buys the product. Hence $f > c - (N - \alpha)\alpha\bar{a}/(N - 1)$. If a firm sets its up-front price slightly above $f' = c - \alpha\bar{a}$ but below f , however, then the firm attracts naive consumers (and possibly also arbitrageurs) and earns positive profits—a contradiction. Thus, naive consumers buy the product in any symmetric pure-strategy equilibrium.

We next derive conditions under which a symmetric pure-strategy equilibrium exists in which arbitrageurs and naive consumers enter the market. This requires that $f \leq -e$. Firms make $f - c$ on arbitrageurs, and $f + \bar{a} - c$ on naive consumers. This can only be an equilibrium if profits are non-negative, that is,

$$f \geq c - \alpha\bar{a}.$$

Since for arbitrageurs to enter we must have $f \leq -e$, the above requires

$$\alpha\bar{a} \geq c + e.$$

If this is the case, Bertrand-type price-competition arguments imply that firms set f such that Inequality 1 holds with equality in a symmetric pure-strategy equilibrium in which arbitrageurs enter.

We now derive conditions under which there is a symmetric pure-strategy equilibrium in which arbitrageurs do not enter the market. This requires that $f \geq c - e$. A firm's profits in this case are $\alpha(f + \bar{a} - c)/N$. If $e \geq \bar{a} - c$, then it is easy to see that there is an equilibrium in which $f = c - \bar{a}$ and firms earn zero profits. Conversely, in a symmetric pure-strategy equilibrium firms cannot be charging a price below $c - \bar{a}$ as this would induce losses, and any price above $c - \bar{a}$ cannot be sustained because then a firm could profitably deviate by undercutting by an appropriate amount and selling to naive consumers only. But now suppose that $e < \bar{a} - c$. We first argue that firms cannot sustain a price $f > -e$ in a symmetric pure-strategy equilibrium. In such a candidate equilibrium naive consumers must buy by our argument above, and thus firms make positive profits. But then for any price $f > -e$, a firm can profitably deviate by minimally undercutting f and attracting all naive consumers without attracting arbitrageurs. Hence $f = -e$ in a candidate equilibrium. For this to be an equilibrium, it must also be the case that a firm does not want to deviate by offering a lower f . Such a firm will attract all naive consumers and all arbitrageurs, and make less than $-e - c$ on arbitrageurs, and $-e + \bar{a} - c$ on naive consumers. This is unprofitable if

$$\frac{\alpha}{N}(-e + \bar{a} - c) \geq -e - c + \alpha\bar{a},$$

or

$$\alpha\bar{a} \leq \frac{N - \alpha}{N - 1}(e + c)$$

The above considerations imply the existence of equilibria stated in Proposition 1.

Next, we show that there is no other equilibria under Case I. Note that if a firm sells its product to arbitrageurs, its profits is at most $-e - c + \alpha\bar{a} < 0$ in this case. It implies that no firm sets $f < -e$ with positive probability in any equilibrium. Then, usual Bertrand-type price-competition arguments and positive profits by setting $f = -e$ lead to the fact that each firm sets $f = -e$ with probability one in any equilibrium. Thus, in Case I there exists a unique equilibrium in which every firm sets $f = -e$.

Finally, we show that no other symmetric Nash equilibrium exists in Cases II-IV. In Cases II and IV, usual Bertrand-type price competition leads to the result that no other symmetric Nash equilibria exist. Consider Case III. We prove by contradiction. Suppose there exists some other symmetric Nash equilibrium. Usual Bertrand-type price competition leads to the result that a firm sets $f > -e$ with probability zero in any symmetric equilibrium. If each firm sets $f \geq -e$ with probability zero, then usual Bertrand-type price competition leads to the result that each firm sets $f = c - \alpha\bar{a}$ in any symmetric equilibrium. Thus, without loss of generality we suppose each firm sets $f = -e$ with probability $q \in (0,1)$, and otherwise sets some $f < -e$. Let $Supp_{f < -e}(f)$ be the support of the equilibrium price distribution subject to $f < -e$. Note that $Supp_{f < -e}(f)$ is non-empty. Take the supremum of $Supp_{f < -e}(f)$ and denote it by \tilde{f} . Each firm never puts positive probability on \tilde{f} ; otherwise a firm has an incentive to slightly decrease \tilde{f} . It implies that if a firm sets \tilde{f} , it can earn at most $q^{N-1}(-e - c + \alpha\bar{a})$. This is strictly less than $q^{N-1} \frac{\alpha}{N}(-e + \bar{a} - c)$, which the firm can earn by setting $f = -e$. Thus, for sufficiently small $\epsilon > 0$, a firm has an incentive to move its price distribution on $(\tilde{f} - \epsilon, \tilde{f})$ to $-e$, a contradiction.

In Case I, arbitrageurs generate a price floor $\underline{f} = -e$. The intuition is simple: if a firm makes its up-front offer too good, it not only attracts consumers away from other firms, it also attracts unprofitable arbitrageurs into the market. The potential for such

adverse selection generates a price floor and ensures positive profits for the industry.

It is interesting to note the relationship between the role of arbitrage in our model and its typical role in finance. The received wisdom in finance is that due to arbitrage, it is impossible to make supranormal profits. In our setting, the threat of arbitrage instead guarantees positive profits for firms.

There are two conditions for positive profits to occur. Condition $\alpha \bar{a} \leq e + c$ says that once arbitrageurs enter the market, ex-post profits from naive consumers do not compensate for the money handed out ex ante to consumers and arbitrageurs. Since it seems likely that α is small in many or most situations, this condition is often satisfied. Condition $\bar{a} > e+c$ says that the additional price firms can impose is greater than the sum of the production cost and arbitrageurs' effort cost. This means that firms cannot compete away ex-post profits without drawing arbitrageurs into the market. A simple back-of-the-envelope calculation shows that in some industries motivating our paper, this condition is also likely satisfied. Hackethal, Inderst and Meyer (2010), for instance, document that German "bank revenues from security transactions amount to €2,560 per customer per year, based on a mean portfolio value of €105,356 Euros." Even if annual account setup and management costs are €1,500 (likely a gross overestimate), and a consumer stays for only one year on average (presumably a gross underestimate), a bank would have to hand out over €1,000 to a new consumer to compensate for the future profits. It seems clear that many individuals would sign up for (and then not use) bank accounts just to get such handouts.

Case IV of Proposition 1 is in some sense the opposite of Case I. If the additional price firms can impose is less than the sum of the production cost and arbitrageurs' effort cost, firms are not limited in their competition by arbitrageurs and hence fully compete away ex-post profits. An example for this kind of situation is hotel rooms. For this application, we think of the price for the room itself as the up-

front fee, and the fees for add-on services—such as the minibar, in-room calls, and the hotel restaurant—as the additional prices. Since the add-ons are arguably a small part of the service, \bar{a} is likely low relative to c , so that the condition for Case IV is likely satisfied.

The money taken from naive consumers *ex post* is handed back to them *ex ante* in Case IV, giving rise to a partial safety-in-markets result. The safety-in-markets result is only partial, however, because nothing ensures that the market is socially desirable (i.e. that $v > c$). The market may only exist because naive consumers underestimate their total purchase cost. Hence, even absent the threat of effective arbitrageurs, regulating and reducing \bar{a} can be socially beneficial as it reduces the consumers' underestimation of their purchase costs, and hence may eliminate the existence of socially wasteful industries.

Proposition 1 has a number of comparative-statics implications for when a binding price floor obtains. Case I tends to apply when firms can charge a lot in additional prices and the product is relatively easy for arbitrageurs to get (so that \bar{a} is high relative to c and e). In contrast, Case IV tends to apply either when firms cannot charge very much in additional prices, and either the product is expensive to produce (so that \bar{a} is low relative to c) or arbitrage is costly (so that \bar{a} is low relative to e).

Proposition 1 also identifies two additional possible cases that can be thought of as being in-between the above two extremes. As in Case I, in Case II firms cannot compete away *ex-post* profits without attracting arbitrageurs into the market. In this case, however, they can make non-negative profits even when arbitrageurs enter, so that they push prices low enough for arbitrageurs to enter. For example, due to the high *ex-post* profits they can make on gamblers, casinos in Las Vegas offer perks—such as cheap flights, hotel rooms, food, and alcohol—to attract visitors. These perks not only attract gamblers, but also "arbitrageur travelers" who are looking for a vacation and can get it cheaper in Las Vegas than elsewhere. While casinos may

lose money on these visitors, profits from gamblers are so high that they can still break even.

For a range of parameter values identified in Case III, there are two symmetric Nash equilibria: one in which arbitrageurs enter the market and firms earn zero profits, and one in which arbitrageurs do not enter the market and firms earn positive profits. Intuitively, multiple equilibria are possible when firms can make positive profits when arbitrageurs are present, but these profits are lower than what they earn when they just avoid attracting arbitrageurs. Then, if other firms set a price just high enough not to attract arbitrageurs ($f = -e$), it is unprofitable to undercut competitors. But when another firm sets a lower price, up to the point of zero profits it is profitable to undercut it and attract both consumers and arbitrageurs.

Recall that we argued that Case I is likely to obtain in many retail-finance markets. Now consider a regulatory intervention such as the US Credit CARD Act discussed above, which limits late payments, over-the-limit, and other fees to be "reasonable and proportional to" the consumer omission. In this model such a regulatory intervention corresponds to lowering the maximum additional price \bar{a} . If we remain in Case I after the intervention (or if it remains unprofitable to offer the product to arbitrageurs), then this intervention translates into a direct benefit to the consumers. This shows that one central argument brought up against such consumer protection legislation—namely that its cost will simply be handed on to consumers—is invalid in markets with binding price floors.

As a word of caution, we want to emphasize that the positive profits we predict are profits at the stage when possible entry costs are sunk and consumers have been identified. In other words, we explain why in seemingly competitive industries with many firms and relatively low entry costs, prices above marginal cost can be sustained. With free entry, however, this of course does not translate into positive economic profits taking all the firms' costs into account.

Binding price floors also have implications for firms' incentives to shift competition to add-on prices, educate consumers about superior products, invent new contract clauses or hidden prices, and the stability of deception when there are sophisticated and naive consumers in the market place. Based on the idea that in most retail-finance markets the threat of arbitrageurs severely limits any up-front payments to consumers, in Heidhues et al. (in preparation) we focus on these questions. Firms in that model can (costlessly) educate consumers about existing additional prices in the entire industry. This enables Arms to lower some of the additional prices when the price floor is binding, educate all consumers about the competitors higher additional prices, and try to attract consumers. Indeed, when selling a socially valuable product, an industry in which there are sufficiently many competitors, firms will educate consumers by unshrouding additional prices and competing on the total contract costs. Nothing, however, ensures that an industry is socially valuable when consumers misunderstand the contract costs; and in socially wasteful industries— independent of the number of competitors— firms will keep deceiving consumers even when educating them would be costless. Furthermore, we highlight that firms have strong incentives to engage in (non-appropriable) exploitative contract innovations—that is in finding new ways of charging consumers unexpected fees—while they have no incentives to engage in (non-appropriable) contract innovations that benefit consumers. Whenever socially superior products exist—for example index funds that are superior to managed mutual funds in the same asset class— deception is stable when sophisticated and naive consumers coexist independent of their proportions in the overall population; intuitively a superior product renders the deceptive product socially wasteful in comparison. We thus conclude that there is considerable scope for deception, and that the resulting deception can be stable and become worse absent regulatory intervention.

3.5 Conclusion

In this paper, we summarize recent work by ourselves and develop new results suggesting that in many economically important markets—especially retail-finance markets—the idea that vigorous competition is sufficient to protect consumers is problematic. In this conclusion, we discuss selected other work in which vigorous competition between firms in itself is also insufficient for consumers to be protected from exploitation. Above, we have emphasized that consumers can benefit from additional consumer-protection rules that limit hidden charges or high fees for changing ones mind a little in the credit market. In the consumer-protection debate such regulation is often referred to as "heavy-handed" and some scholars have pushed alternative, information-based approaches.¹⁹ While we think many of these suggestions are interesting and potentially fruitful, we use this section to highlight that such information-based intervention can—similar to the regulation of add-on prices—also have unintended consequences, and regulation will always have to weigh its direct benefits with such potential indirect costs.²⁰

In seminal work, Gabaix and Laibson (2006) develop a model closely related to the one we introduced in Section 4. In their model, the market is populated by naive consumers who ignore a given add-on price and sophisticated consumers who observe this add-on price and can undertake costly, and inefficient steps to avoid it.²¹ A

¹⁹ For a discussion of the potential benefits of such regulations, see Bar-Gill (2011).

²⁰ See Armstrong (2011) for some indirect costs of consumer-protection regulations with rational consumers.

²¹ In Sections 4, we differ from Gabaix and Laibson (2006) by allowing for industries to be socially wasteful, and by assuming the existence of arbitrageurs rather than sophisticated consumers who can exert efforts to

good example may be roaming charges that naïve consumers ignore while sophisticated consumers take efforts to avoid calling from a foreign country and incurring high roaming charges. Because firms cannot ex ante differentiate between sophisticated and naïve consumers, the ex-post exploitation profits from naïves are handed out ex ante to attract consumers. In equilibrium firms break even by earning some money from naïve consumers and losing money on sophisticated consumers. Gabaix and Laibson point out that in such an environment, firms have no incentive to educate consumers via unshrouding add-on prices. Once a firm unshrouds these add-on prices, some consumers become sophisticated. But such sophisticated consumers are unprofitable to attract because in the market equilibrium firms cross-subsidize sophisticated consumers from the profits they earn with naïve ones. Interestingly—as is highlighted in Ko (2011)—in Gabaix-Laibson's framework educating consumers can lead to a total welfare loss. Often if only a few consumers are educated, the market equilibrium remains exploitative, and the newly educated consumers undertake inefficient efforts to avoid the add-on costs. If enough consumers become sophisticated, on the other hand, an exploitative equilibrium ceases to exist, which is welfare-increasing in their environment. The desirability of consumer education, thus, depends on its effectiveness in this environment.

In a similar vein, Grubb (2011) shows that providing more information to consumers can be detrimental to total welfare.²² He

avoid the add-on price. This reflects our intuition that the threat of people interested in easy money is very real in many retail-finance markets, and that it is efficient to keep such arbitrageurs out of the industry. Our analysis also focuses on different

²² Heidhues and Köszegi (2009) demonstrate that more information can hurt a partially-naïve decision maker with a self-control problem. More

focuses on services—e.g. mobile phone services—for which consumers who do not track past usage do not know the price of the next unit they are purchasing, and asks whether regulation that requires the disclosure of this price is beneficial. Such price-posting regulation, however, can hamper efficient screening in his model. High fees for high usage prevent high-value consumers from taking contracts designed for low-value ones, and absent price-posting regulation these high fees for high volume units do not distort low-value consumers' usage decision because these are based on an average price rather than the actual marginal price. Price posting, however, reveals the marginal price and distorts the low-value consumers' usage decisions.²³

In a paper that seems especially relevant for the mutual fund market, Spiegler (2006) highlights that competitive markets can exist for socially wasteful products. In his model, consumers choose on the basis of the last performance from a small sample of randomly performing firms. Due to the consumers' mistaken inferences, past performance differences create an artificial product differentiation, which allows firms to earn positive profits and hence can explain the existence of markets for "quacks". Thus competition provides no safety to consumers with such mistaken beliefs. Furthermore, without educating consumers about their failure in reasoning, providing information to them is unlikely to weed out the existence of quacks. Educating consumers about their inability to reason, however, seems extremely difficult in practice.

information may induce her to take costly, yet insufficient, attempts at self-control, which can in addition make later indulgence less enjoyable.

²³ When consumers underestimate their future demand, Grubb (2011) shows that price-posting regulation can be beneficial to consumers.

In addition, information-provision regulation can be inhibited by the fact that many consumers often (partially for good reasons) do not read contracts, systematically underestimate their demand for add-on services, forget payments they thought they would undertake, and hence systematically misestimate their costs. Information provision may be difficult if consumers have systematic mis-perceptions as in Spiegler (2006), and in the model of Section 3.3 consumers need to be *fully* educated about their own self-control problem for the educational effect to have any benefit to them.

Another, often relatively uncontroversial, regulation is one that increases the comparability between products. Increasing the comparability, however, can be counterproductive if it increases the firms' incentives to obfuscate in other ways (for a formal model thereof see Piccione and Spiegler (2010)). Regulators attempting to overcome welfare-losses from consumer misunderstandings will need to take such equilibrium effects into account and carefully monitor the market outcome.

In summary, we believe that the safety-in-markets argument severely overstates the benefits of competition in the presence of systematic consumer misunderstandings. A more subtle and difficult issue is whether there are feasible consumer-protection regulations that improve market outcomes. As is well-known from other areas of regulation, regulation typically involves unintended side-effects and these have to be balanced with potential welfare improvements. For example, in the model we present in Section 3.4 reducing the maximal additional price firms can charge typically translates into a direct benefit to consumers. Our model thus predicts that regulating and reducing ATM charges will not lead to a comparable increase in account fees. But in this example, it is extremely likely that it will lead to a reduction in the number of ATM-machines available, and regulators will have to balance the former positive with latter negative effect. Similarly, if a lower a in our model above can be circumvented through firms inventing other, novel ways of charging hidden fees, consumer protection will at minimum remain

incomplete. But as we have emphasized in this section—even were feasible—other interventions that focus on providing information or increasing comparability between products also have unintended side effects. Of course, the theoretical potential for counterproductive effects does not imply that regulation is undesirable per se. Rather, we believe that its benefits and costs have to be investigated on a case-by-case basis.

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