Deceptive Products and Naivete-Based Discrimination

An overview of theoretical insights, based partly on joint work with Paul Heidhues and Takeshi Murooka

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Consumer Mistakes in the Market

Stylized fact: in a number of consumer retail markets, many consumers underestimate certain fees ("hidden fees") associated with product use.

- Retail banking: avoidable fees, especially overdraft fees (Cruickshank 2000, OFT 2008, Stango and Zinman 2009, Armstrong and Vickers 2012)
- Credit cards: interest payments (Ausubel 1991)
- Mortgages: broker compensation, payment changes (Woodward and Hall 2010, Bucks and Pence 2008)
- Investments: ongoing fees (Gruber 1996, Barber, Odean and Zheng 2005, Anagol and Kim 2012, Duarte and Hastings 2012)
- Printers: cartridge costs (Hall 1997)
- Cell phones: extra minutes, roaming (FCC "bill shock" worry)

How does this change our understanding of markets and firm interaction?

1. How do sophisticated and naive consumers fare?
2. What are firms' incentives to educate consumers about their mistakes?
3. What kinds of products are sold in a deceptive way, and which products are profitable?
4. How do firms design contracts and products in the presence of naive consumers?
5. What are the consequences of naivete-based discrimination?

Suppose a bank account costs \$30, overdraft protection \$0 to provide.

- Other examples: printer and cartridge, hotel room and wifi/minibar.

Competitive banks choose an account maintenance fee and an overdraft fee $\leq$ \$50.

A share α of consumers is naive and a share $1 - \alpha$ is sophisticated.

- Naive consumers ignore overdraft fee but end up paying it.
- Sophisticated consumers are aware of, but don't observe, the overdraft fee, and at cost $e < 50$ can avoid it.

Equilibrium is easy to derive:

- Firms impose the maximum overdraft fee $50.
- Sophisticated consumers avoid the overdraft fee.
- Firms charge $30 - \alpha \cdot 50$ for account maintenance.

Example: the "free if in credit" banking model (Armstrong and Vickers 2012).

Economic Implications

1. Cross-subsidy from naive to sophisticated consumers (Gabaix and Laibson 2006).

2. Efficiency loss due to

   - Inefficient effort cost e ("exploitation distortion"); and
   - The wrong set of consumers buys ("participation distortion"):
       - Naive consumers with value between $30 - \alpha \cdot 50$ and 30 buy.
       - Sophisticated consumers also face "wrong price" $30 - \alpha \cdot 50 + e$.

Emphasis in literature is on cross-subsidy, but we think efficiency consequences important.

   - Back-of-the-envelope calibration: participation distortion in credit-card market could be half of market size.

But Won't Markets Help?

Classical view: whenever consumers have a problem that leads to inefficiency, firms will help.

- E.g., mistake $\Rightarrow$ education; self-control problem $\Rightarrow$ commitment.

Let's see . . . let's pretend to be a compulsive credit-card user.

Web | Images | Maps | News | Shopping | Gmail | more ▼   Sign in

impulsive credit card spending   [Search]   Advanced Search
                                                      Preferences

Web   Results **1** - **10** of about **59,900** for **impulsive credit card spending**. (0.23 seconds)

Prevent **Impulsive** Spending: Put Your **Credit Cards** on Ice ...
Jun 29, 2007 ... Have a problem with **impulsive spending**? Throw your
credit cards in the freezer!
www.associatedcontent.com/article/292723
/prevent_**impulsive_spending**_put_your.html - 48k - Cached - Similar pages

Article: **Impulsive** and compulsive **spending**
Compulsive **spending** is many times an addiction to **credit cards**. ... Since
impulsive and compulsive **spending** patterns can often be justified or
rationalized ...
www.crown.org/Library/ViewArticle.aspx?ArticleId=426 - 88k -
Cached - Similar pages

The Siren Song of **Impulsive Spending**
The Siren Song of **Impulsive Spending**. Thursday August 14, 2008. Is your
credit card screaming to be used? Do random items in the mall flag you
down to be ...
bipolar.about.com/b/2008/08/14/the-siren-song-of-**impulsive-spending**.htm -
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Impulse Spending: Stop Spending By Freezing Your Credit
Card In ...
Impulse Spending: Stop **Spending** By Freezing Your **Credit Card** In Ice.
Jun 28, 2008 at 12:38 PM; Post a comment · **Impulse Spending**: Stop
Spending By Freezing ...
yll.vox.com/library/post/**impulse-spending**-stop-**spending**-by-freezing-your-
credit-card-in-ice.html - 73k - Cached - Similar pages

How To Avoid **Impulsive Spending**
How to Avoid **Impulsive Spending** Your spouse or partner complains that
you spent too much money. You are surprised when your **credit card** bill
arrives and ...
www.scribd.com/doc/2881651/How-To-Avoid-**Impulsive-Spending** - 93k -
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Impulse Spending: Stop Spending By Freezing Your Credit
Card In Ice
Jun 16, 2008 ... If you have trouble controlling the amount and frequency of
your **credit card** purchases try putting your **credit card** in ...
consumerist.com/tag/**impulse-spending**/?i=5016722&t=stop-**spending**-by-
freezing-your-**credit-card**-in-ice - Similar pages

Improve Your Shopping Habits: How To Recover From An **Impulse** Buy
Sep 18, 2008 ... Someone was talking about her **credit card** bill at a local dept store. ...
Your Spouse Has Debt and A **Spending** Addiction: Avoid A Bailout ...
www.thedigeratilife.com/blog/index.php/2008/09/18/shopping-habits-how-to-recover-from-an-
impulse-buy/ - 73k - Cached - Similar pages

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Incentive to Educate Consumers
Gabaix and Laibson (QJE 2006)

Would a bank want to reveal overdraft fees?

- If a bank reveals, all consumers become sophisticated.
- Sophisticated consumers can choose to buy from another bank at price $30 - \alpha \cdot 50$ and avoid overdrafting.
- The revealing bank can't profitably beat this if $30 - \alpha \cdot 50 + e \leq 30$, or $e \leq \alpha \cdot 50$.

Intuition:

- Revealing allows a firm to trade with sophisticated consumers more efficiently.
- BUT: sophisticated consumers may prefer inefficient trade at cross-subsidized price.

Broader intuition: education turns profitable naive consumers into unprofitable sophisticated consumers, so often no incentive.

Note: a policy of full education is welfare-increasing, but partial education may not be!

Inferior Products and Profitable Deception
with Paul Heidhues and Takeshi Murooka (2014)

We study in more detail the circumstances under which firms sell deceptive products, focusing on profitable deception.

Take model from above with the following modifications:

- $e = \infty$, but sophisticated consumers observe hidden fees.
- Transparent price must be non-negative.
- There are two products, and each firm can offer both:

	value	cost	max. hidden fee
superior	10	0	0
inferior	11	2	3

- Example: passively versus actively managed mutual funds.
    - Passive funds are better, yet active funds remain popular.

Inferior Products Rule

Plausible equilibrium:

- Firms offer superior product at price zero; sophisticated consumers buy.
- Firms offer inferior product at price zero, but with hidden fee of 3; naive consumers buy.

Some interesting features:

- Firms make zero profits on superior product, positive profits on inferior product!
  - ⇒ Firms want to push the *inferior* product.

- The equilibrium is very robust to education.
  - Not even a specialist in the superior product has an incentive to educate.
  - Says that managed funds have remained profitable and attracted so much entry *exactly because* superior index funds exist.

Emerging observation: in some situations, firms design contracts specifically tailored to exploit common mistakes, exacerbating them.

Look at a specific phenomenon: present bias and borrowing.

- Overborrowing is one of the most commonly invoked examples of present bias.
- But much of borrowing is for *future* consumption!

Setup

Risk-neutral lenders interact with consumers over three periods.

- Period 0: Lenders offer contracts (b, r, d), where b is loan amount, r is interest rate, d is discount (e.g., airline miles, cash back, or other credit-card perk).
- Period 1: borrower chooses the amount q to repay in period 1, leaving $(b - q)(1 + r)$ to be repaid in period 2.

Preferences are time-inconsistent:

- Self 0's utility, and welfare, is $u(b) - q - (1 + r)(b - q) + d$.
- Self 1 chooses q to minimize $q + \beta(1 + r)(b - q)$, where $1/2 < \beta \leq 1$.
- Self 0 believes that self 1 will discount period-2 payments by $\hat{\beta}$.

Firms observe $\hat{\beta}$. Given $\hat{\beta}$, two types:

- Sophisticated: $\beta = \hat{\beta}$.
- Naive: $\beta = \beta_{na} < \hat{\beta}$.

Characterizing the Equilibrium Contracts

Analysis:

- Naive delay repayment if $\beta_{na}(1+r) \leq 1 \Rightarrow$ setting $r = (1 - \beta_{na})/\beta_{na}$, can collect interest $(1 - \beta_{na})b/\beta_{na}$ from them.
- Then, consumers expect not to delay, and sophisticated don't.
- Let $\hat{u}$ be perceived utility firm wants to give to consumer. Then, firm's problem is

$$\max_{b,d} \quad \underbrace{\alpha\left(b + (1 - \beta_{na})b/\beta_{na}\right) + (1 - \alpha)b}_{\text{actual repayment}} - d - b$$

$$\text{subject to} \quad u(b) - \underbrace{b}_{\text{expected repayment}} + d = \hat{u}.$$

- Solving constraint for d and plugging in:

$$\max_b \quad \underbrace{\alpha(1 - \beta_{na})b/\beta_{na}}_{\text{unant. interest}} + \underbrace{u(b) - b}_{\text{social surplus}} - \hat{u} \Rightarrow u'(b) = 1 - \alpha(1 - \beta_{na})/\beta_{na}$$

Intuition: incentive to increase lending to generate more unanticipated interest from naive.

Why not set interest low enough to get both to delay?

- Then, consumers anticipate interest, negatively impacting participation constraint.
- Recall maximand:

$$\text{profit} = \text{unant. interest} + \text{social surplus} - \hat{u}$$

  $\Rightarrow$ firm wants to increase *unanticipated* interest, not simply interest.

Note that this outcome occurs for $\hat{\beta}$ arbitrarily close to β.

- In this sense, contract exacerbates small amounts of naivete.

Welfare-Improving Interventions

Disclosure in itself doesn't work.

- Although some scope for educating consumers about themselves.

Capping total interest payments often raises welfare.

- E.g., suppose total interest payment can't be more than p (sufficiently low).
- Then, firms can't increase profits from consumer's mistake by increasing lending $\Rightarrow$ optimal consumption.

Perhaps more realistically: capping total interest payments per dollar borrowed, or limiting certain penalties could have similar effects.

- Indeed, this is key part of recent US regulations.

Naivete-Based Discrimination
with Paul Heidhues (2015)

What is the welfare effect of firms knowing more about consumers?

- Large literature presumes that info is about preferences.
    - Then, effect of information is in general ambiguous.
    - But: perfect discrimination always maximizes social welfare.

The literature on deceptive products raises the possibility that firms engage in naivete-based discrimination using external information.

- Use observable correlates, behavior.
- Some direct evidence suggests, and economic logic dictates, that this is going on.
- Especially relevant today in the context of the privacy debate.

$\Rightarrow$ We initiate the study of naivete-based discrimination.

A Reduced-Form Model

Study naivete-based discrimination with stripped-down model:

- Firm n offers a contract (f_n, a_n), where $f_n \in \mathbb{R}$ is an "up-front price" and $a_n \in [0, a_{max}]$ is an "additional price."
- Naive consumers ignore a_n when choosing contract, but end up paying it.
- Sophisticated consumers avoid paying a_n.

Key: charging a_n generates an "exploitation distortion" $k(a_n)$.

- In (version of) banking model: a_n is overdraft fee, $k(\cdot)$ is cost of avoidance.
- In credit model: a_n is (unanticipated) interest, $k(\cdot)$ is cost of overlending.

The Distortionary Impact

Three possibilities:

1. Homogenous distortions: $k(a_n)$ is generated on both sides of the market.

   - E.g., credit model.

2. Sophisticated-side distortions: $k(a_n)$ is generated on the sophisticated side only.

   - E.g., avoidance model.

3. Naive-side distortions: $k(a_n)$ is generated on the sophisticated side only.

   - E.g., distortion in consumption pattern due to unexpected payment.

Naivete-based discrimination: firms sort consumers into two pools with different shares of naive consumers.

Homogenous Distortions

Result: if an arguably weak condition on $k(\cdot)$ (decreasing absolute convexity) holds, then naivete-based discrimination lowers total social welfare.

Intuition:

- Firms increase additional price for the more naive pool — lowers welfare.
- Firms decrease additional price for the more sophisticated pool — raises welfare.
- Because an increase in a pre-existing distortion is more harmful than an equal decrease is beneficial, the net effect is often negative.
- Caveat: the additional price may be much more sensitive to decreases than to increases in α.
  - Decreasing absolute convexity rules this out.

Decreasing Absolute Convexity

Decreasing absolute convexity of $k(\cdot)$ is empirically testable, and based on specific applications, it seems weak.

E.g., in the credit-card application, decreasing absolute convexity of $k(\cdot)$ is weaker than prudence of the consumption-utility function.

So with homogenous distortions, often get stark contrast:

- With preference-based discrimination, firms knowing everything *maximizes* welfare.
- With naivete-based discrimination, firms knowing everything *minimizes* welfare.

Sophisticated-Side Distortions

Unlike with homogenous distortions, it matters whether firm or consumer pays the exploitation distortion.

As in overdraft example, assume consumer does.

Result: perfect naivete-based discrimination maximizes welfare.

- If a firm knows that a consumer is sophisticated, no point imposing an additional price.
- If a firm knows that a consumer is naive, it can exploit the consumer without triggering a distortion.

But: if $k(\cdot)$ satisfies decreasing absolute convexity, naivete-based discrimination lowers welfare if the share of naive consumers and the information are both small.

- Information improves firms' ability to exploit naive, and since most are sophisticated, they have to bear cost.

Naive-Side Distortions

Either the consumer or the firm may pay the distortion.

- Example of latter: administrative costs of handling complaints.

Result: both when the consumer pays the exploitation distortion and when the firm does, naivete-based discrimination does not affect welfare.

Intuition: consumer pays.

- Then, seller doesn't care about distortion per se, just maximizes profits from additional price.
  - $\Rightarrow$ Additional price doesn't depend on α.
  - $\Rightarrow$ Information has no effect on total welfare.

Intuition: firm pays.

- Both benefit and cost of raising a_n arise only for naive $\Rightarrow$ optimal a_n independent of α.

Broad Lessons

Markets don't just work for the benefit of consumers.

- Markets provide incentives to serve *disposition to pay* (generalization of *willingness* to pay).
- Mistakes are often a profitable source of disposition to pay.
- Hence, firms have an incentive to seek out and exacerbate mistakes.
    - Limited incentive to educate.
    - Sale of inferior products to make profits.
    - Lower welfare by seeking and using information about naivete.
    - Design products and contracts to isolate and exacerbate small mistakes.
- Competition works not to help naive consumers, but to redistribute to sophisticated consumers.

This is not inconsistent with view that markets have tremendously improved welfare.

- Disposition to pay is correlated with willingness to pay.

But it does say markets could work better, and an important agenda is identifying policy responses.