



Limited
attention I

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Are you paying attention?

- In most economic analyses, it is assumed that people make **full use** of **all relevant information** that is available to them.
- More and more evidence suggests that when people make decisions, they don't pay attention to all relevant information.
- The laboratory studies in psychology indicate that **attention is a limited resource**. That is, people have limited attention or limited cognitive capacity.



Psychology and Economics: Evidence from the Field

STEFANO DELLAVIGNA*

The research in Psychology and Economics (a.k.a. Behavioral Economics) suggests that individuals deviate from the standard model in three respects: (1) nonstandard preferences, (2) nonstandard beliefs, and (3) nonstandard decision making. In this paper, I survey the empirical evidence from the field on these three classes of deviations. The evidence covers a number of applications, from consumption to finance, from crime to voting, from charitable giving to labor supply. In the class of nonstandard preferences, I discuss time preferences (self-control problems), risk preferences (reference dependence), and social preferences. On nonstandard beliefs, I present evidence on overconfidence, on the law of small numbers, and on projection bias. Regarding nonstandard decision making, I cover framing, limited attention, menu effects, persuasion and social pressure, and emotions. I also present evidence on how rational actors—firms, employers, CEOs, investors, and politicians—respond to the nonstandard behavior described in the survey. Finally, I briefly discuss under what conditions experience and market interactions limit the impact of the nonstandard features.

Nonstandard decision making:

A simple model of attention as a scarce resource

- Consider a good whose value V (inclusive of price) is determined by the sum of two components, **a visible component** v and **an opaque component** o ,

$$V = v + o.$$

- Due to inattention, the consumer perceives the value to be

$$\hat{V} = v + (1 - \theta)o.$$

$\theta \geq 0$ denotes **the degree of inattention**.

$\theta = 0$ as the standard case of full attention

Nonstandard decision making:

A simple model of attention as a scarce resource

- Due to inattention, the consumer perceives the value to be

$$\hat{V} = v + (1 - \theta)o$$

- The interpretation of θ is that each individual sees the opaque information o , but then processes it only partially, to the degree θ .
- The inattention parameter θ is itself a function
 - of the salience $s \in [0,1]$ of o and
 - of the number of competing stimuli N .
- That is, $\theta = \theta(s, N)$



Saliency

Nonstandard decision making:

A simple model of attention as a scarce resource

- Due to inattention, the consumer perceives the value to be

$$\hat{V} = v + (1 - \theta(s, N))o.$$

$$\theta_s < 0, \theta_N > 0$$

- This model suggests some ways to test for $\theta > 0$:
- If we observe s , test whether $\frac{d\hat{V}}{ds} > 0$.
- If we observe N , test whether $\frac{d\hat{V}}{dN} < 0$.



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FIELD EXPERIMENTS

...Plus Shipping and Handling: Revenue (Non)
Equivalence in Field Experiments on eBay

Tanjim Hossain*

John Morgan†

- A field experiment on eBay to investigate how people react to shipping prices.
- On eBay, total price equal to winning bid plus shipping costs.

Hossain & Morgan (BE Advances in Policy, 2006)

For each item auctioned, consider the following two treatments:

- **Treatment A:** Opening bid of \$4.00, shipping cost of \$0.00.
 - **Treatment B:** Opening bid of \$0.01, shipping cost of \$3.99.
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- For both treatments A and B, the effective reserve price is \$4.00, and thus a standard model would say these auctions are equivalent .

Hossain & Morgan (BE Advances in Policy, 2006)

- The standard model expects total price to be the same, so expect winning bid to be \$3.99 larger in Treatment A, compared to B.
- But perhaps people don't fully attend to the shipping costs....

Hossain & Morgan (BE Advances in Policy, 2006)

For each item auctioned, they do so using all treatments:

- They conduct 80 auctions, 40 with CDs (4 each for 10 popular CDs) and 40 with video games for Xbox (4 each for 10 popular games).
- For each item auctioned, all treatments use an identical description of item, and an identical description of shipping process (via USPS first-class mail).
- New seller ID created for each auction, each with zero feedback.

Table 3. Revenues from Low Reserve Treatments

| CD Title | Revenues | Revenues | B - A | Percent Difference |
|---------------------------------|--------------------------|--------------------------|--------------|---------------------------|
| | under Treatment A | under Treatment B | | |
| Music | 5.50 | 7.24 | 1.74 | 32% |
| Ooops! I Did it Again | 6.50 | 7.74 | 1.24 | 19% |
| Serendipity | 8.50 | 10.49 | 1.99 | 23% |
| O Brother Where Art Thou? | 12.50 | 11.99 | -0.51 | -4% |
| Greatest Hits - Tim McGraw | 11.00 | 15.99 | 4.99 | 45% |
| A Day Without Rain | 13.50 | 14.99 | 1.49 | 11% |
| Automatic for the People | 0.00 | 9.99 | 9.99 | |
| Everyday | 7.28 | 9.49 | 2.21 | 30% |
| Joshua Tree | 6.07 | 8.25 | 2.18 | 36% |
| Unplugged in New York | 4.50 | 5.24 | 0.74 | 16% |
| <i>Average</i> | <i>7.54</i> | <i>10.14</i> | <i>2.61</i> | <i>35%</i> |
| <i>Average excluding unsold</i> | <i>8.37</i> | <i>10.16</i> | <i>1.79</i> | <i>21%</i> |

| Xbox Game Title | Revenues | Revenues | B - A | Percent Difference |
|------------------------|--------------------------|--------------------------|--------------|---------------------------|
| | under Treatment A | under Treatment B | | |
| Halo | 34.05 | 41.24 | 7.19 | 21% |
| Wreckless | 44.01 | 33.99 | -10.02 | -23% |
| Circus Maximus | 40.99 | 39.99 | -1.00 | -2% |
| Max Payne | 36.01 | 36.99 | 0.98 | 3% |
| Genma Onimusha | 41.00 | 32.99 | -8.01 | -20% |
| Project Gotham Racing | 37.00 | 38.12 | 1.12 | 3% |
| NBA 2K2 | 42.12 | 42.99 | 0.87 | 2% |
| NFL 2K2 | 26.00 | 33.99 | 7.99 | 31% |
| NHL 2002 | 36.00 | 37.00 | 1.00 | 3% |
| WWF Raw | 33.99 | 40.99 | 7.00 | 21% |
| <i>Average</i> | <i>37.12</i> | <i>37.83</i> | <i>0.71</i> | <i>2%</i> |

Hossain & Morgan (BE Advances in Policy, 2006)

Results:

- Comparing Treatments A & B, the latter attracts more bidders and more revenue for both CDs and Xbox games.

Salience & Taxation



Unit Tax vs. Ad Valorem Tax

- **Unit tax/Specific tax:** pay extra $\$t$ for each unit sold
 - e.g. if buy quantity x , then consumer pays $(p_x + t)x$
- **Ad valorem tax:** pay extra $t\%$ for total purchase price
 - e.g. if total price is $p_x x$, then consumer pays $p_x(1 + t)x$

Behavioral Model

- How does the model change if the complexity/visibility of the tax schedule influences my behavior?
- Accommodate for possibility of under- or over-reacting to the tax t

Behavioral Model

Unit tax

- Standard budget constraint:

$$(p + t)x + y \leq M$$

- Behavioral budget constraint:

$$(p + \phi t)x + y \leq M$$

Ad valorem tax

- Standard budget constraint:

$$p(1 + t)x + y \leq M$$

- Behavioral budget constraint:

$$p(1 + \phi t)x + y \leq M$$

Behavioral Model

$$\text{Max}_{x,y} U(x, y)$$

Subject to $(p + \phi t)x + y \leq M$, or

$$p(1 + \phi t)x + y \leq M$$

Typically refer to ϕ as the salience parameter

If $0 < \phi < 1$, then consumers under-react to the tax (i.e. the tax is not as salient as the regular price)

If $\phi > 1$, then consumers over-react to the tax

If $\phi = 1$, we are back to the standard model

Note: most of the literature finds/assumes under-reaction

Salience and Taxation: Theory and Evidence

By RAJ CHETTY, ADAM LOONEY, AND KORY KROFT*

Using two strategies, we show that consumers underreact to taxes that are not salient. First, using a field experiment in a grocery store, we find that posting tax-inclusive price tags reduces demand by 8 percent. Second, increases in taxes included in posted prices reduce alcohol consumption more than increases in taxes applied at the register. We develop a theoretical framework for applied welfare analysis that accommodates salience effects and other optimization failures. The simple formulas we derive imply that the economic incidence of a tax depends on its statutory incidence, and that even policies that induce no change in behavior can create efficiency losses. (JEL C93, D12, H25, H71)

A central assumption in public economics is that agents optimize fully with respect to tax policies. For example, Frank P. Ramsey's (1927) seminal analysis of optimal commodity taxation assumes that agents respond to tax changes in the same way as price changes. Canonical