Externalizing the Internality

Sendhil Mullainathan
Harvard University

Josh Schwartzstein
Dartmouth
Behavioral Economics

- People are time inconsistent
  - Might over borrow
  - Might undersave
  - Might "overweight" small hassle costs in decisions
    * FAFSA forms

- Attention is limited
  - Shrouded attributes
  - Reminders (or failures to remind) matter
How should policy respond?
Deeper Question

• How will the market respond to these biases?
## Market Reaction to Bias

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Spiegler (2011) great review
An Interesting `Bias’

• Diabetes serious disease

• Broad consensus of how to treat
  – Insulin to control- pills and injections
  – Highly effective

• Yet adherence rates very low (65%)
  – Sporadic adherence (take some, not others)
  – Severely increases complication risk (Sokol et al. 2005)
## Non-adherence Bias

<table>
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<tr>
<th>Drug</th>
<th>Benefits</th>
<th>Adherence Rates</th>
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<tr>
<td>Statins</td>
<td>Reduce all cause mortality (Relative Risk .90), cardiovascular disease mortality (RR .8), fatal myocardial infarction (RR.82), non-fatal MI (RR.74), and strokes (RR .86)</td>
<td>Adherence &lt; 70%</td>
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<td>Beta-blockers</td>
<td>Reduce mortality by 25% post heart attack</td>
<td>Adherence &lt; 70%</td>
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<td>Anti-asthmatics</td>
<td>Reduced Hospital Admissions (OR .58). Improvement in airflow obstruction (OR .43)</td>
<td>Adherence &lt; 50%</td>
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<td>Glucose control</td>
<td>Decrease of cardiovascular mortality (OR .74); risk of hospitalization halved</td>
<td>Adherence &lt; 65%</td>
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<td>Immunosuppressants</td>
<td>Reduction in the risk of organ rejection seven-fold</td>
<td>Adherence &lt; 66-75%</td>
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GlowCaps™
light and sound
remind you to take your prescriptions every day
GLOWCAP RESEARCH RESULTS

PERCENT OF ADHERENT* PARTICIPANTS IN EACH GROUP

KEY

GLOWCAPS
100%

GLOWCAPS, PLUS $
99%

CONTROL GROUP
52%

Slightly misleading: adherence => 25 days of month
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<td>Market Outcome</td>
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<td>Who would demand Glowcaps</td>
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Actual Demand for Glowcaps

• Large employers with health plans

• Medicare

• Pharmacy industry

• Why?
Externalizing the Internality

• Internality felt by the individual
  – Failure to adhere

• A third party also feels some consequences
  – Non-adherence drives up future health costs
  – Non-adherence drives down demand for drugs

• This market situation *externalizes* the internality

• Independent profit motive to affect the internality
A Broader Framework

• Consumer makes choice $L$ (buy treadmill?)
  – True benefit depends on type $y$ (how much will I use?)
  – Utility $u(L, y)$

• Consumer mistake:
  – Act as if benefit is type $y'$ (I’ll use a lot!)
  – Optimizes utility $u(L, y')$ instead of $u(L, y)$
  – So instead of choosing $L^*(y)$ he would like $L^*(y')$

• Tension between *stated value* and *true value*
Catering –
Internality not Externalized
Firms care only about Y, not y

<table>
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<th>L*(y’)</th>
<th>u(L*(y’))-u(L*(y))</th>
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<td>Direct Surplus</td>
<td>Internality</td>
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<tr>
<td>Value treadmill</td>
<td>Unused treadmill</td>
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Treadmill seller profits do not additionally depend on this
Catering

• Market doesn’t differentiate between $y$ and $y'$
  – True value vs willingness to pay
• No incentive to second guess your value
• Will not sort/screen on true value ($y$).
Exploit the bias –
Internality Positively Externalized

Firms care about $y$ in the wrong direction

$\text{Direct Surplus} \quad \text{Internality}$

$\text{unused gym membership}$

$\text{Gym profits}$

$\text{higher if gym used less}$
Market Exploitation

• Market cares about true value
  – But makes more money the bigger the internality

• The market is not neutral about the bias but will exaggerate it if it can

• *Notice difference between catering and exploitation*
Market Discipline - Internality Negatively Externalized

Firms care about $y$

$L^*(y')$  $u(L^*(y')) - u(L^*(y))$

Direct Surplus  Internality

Take medication  Health consequences

Some insurer profits depend on health consequences
Market Discipline

• Market now cares about true value as well
  – Do not just set copay and let whoever wants to take medication take it
  – Interested in ensuring that high (health) return individuals take the medication

• Undertake activities to reduce internality $y - y'$
Deeper Insights

• Can conceptualize behavioral biases as internality

• Creates a new policy lever
  – Externalize the internality
  – Pigouavian Behavioral Economics
Overview of Talk

• One example in detail

• Briefly sketch a few other illustrative examples
Two caveats about this talk

• Will not spend time...
  – Defending that there is a bias

• Will not spend time...
  – On the welfare problem (Bernheim and Rangel 2009)

• Both important but beyond today’s scope
Useful Expenditure
No cash

Get income y

Bank can lend

Person can repay
Psychic costs of default
Lending Market

• Bank can provide a loan $L$ at rate $r$
  – Credit is uncollateralized.

• Borrower incentives to repay modeled as non-monetary costs of default
  – Future cost of credit record
  – Harassment costs

• Utility if he borrows $L$ and repays $l$

\[ L + \delta[u(y - l) - \max\{d(L(1 + r) - l), 0\}] \]
First Best

• Enough credit to equalize marginal utility of spending tomorrow with marginal utility of the durable

\[ \delta(1 + r)u'(y - L) = 1 \]

• Some simplifications for today:
  – \( \delta = 1, \ r = R = 0 \) (without loss of generality)
  – \( u(x) = \ln(x) \)

• First best is now:

\[ L = y - 1 \]
Market Outcome

• Competitive firms (zero-profit condition)

\[
\max_{L, l} \quad L + u(y - l) \\
\text{s.t.} \\
l = \arg \max_{0 \leq l \leq L} \quad u(y - l) - d(L - l) \\
l = L
\]
Repayment incentives

• Utility

\[ \ln(y - l) - d(L - l) \]

• First order condition for log utility:

\[ \frac{1}{l - y} = -d \]

\[ l = y - \frac{1}{d} \]
Market Outcome

• Competitive firms

\[ \max_L L + \ln(y - l) \]

s.t.

\[ L \leq y - \frac{1}{d} \]
Rational Borrowers

• First best:
  – Borrower gets \( y - 1 \)

• Realized outcome
  – Borrower only allowed to borrow \( y - \frac{1}{d} \)
  – Borrower takes \( \min\{y-1, y-1/d\} \)

• Standard moral hazard credit market failure
  – Obvious implication: increases in \( d \) (weakly) increases welfare
  – The more difficult to default on credit the better
Behavioral Bias

• Borrowers borrow as if income is higher tomorrow than it is
  – Overconfidence
  – Misunderstanding terms of credit
  – Impulsivity

• Consumers act as if they will earn $Y > y$
Firm’s Problem

• Competitive firms (zero-profit condition)

$$\max_{L,l} \ L + u(Y - l)$$

s.t.

$$l \leq y - \frac{1}{d}$$

Perceived income

Actual income
Outcome

• First best
  – Borrower borrows $y - 1$

• Realized outcome
  – Borrower only allowed to borrow $\frac{y - 1}{d}$
  – Borrower takes $\min\{Y - 1, \frac{y - 1}{d}\}$
    • Note: Rational borrower only takes $\min\{y - 1, \frac{y - 1}{d}\}$
Credit Constrained

\[ y - 1 \]

Borrowers Perceived First Best \( y - \frac{1}{d} \)

Social First Best \( y - 1 \)

Credit Constrained

\[ \frac{1}{d} \]

\[ d = 1 \]
Credit constraint

• When $d < 1$:
  – Borrower still borrows less than first best $L < y - 1$

• Same as before:
  – Low psychic cost of default also produces inefficient low credit access
Credit Constrained

Over Borrowing (Catering)

Self Restrainted

$1 - (Y - y)^{1/d}$

$Y - 1$

$y - 1$

Credit Constrained
Catering

• When $d > 1/(1-(Y-y))$: 
  – Borrower allowed to borrow up to $Y-1$
• Will therefore over-borrow

• This is the usual idea that markets cater to the bias of individuals.
• If the person wants to borrow foolishly, the market will happily lend it as long as they can repay
  – *NOTE: Not exploitation*. Market is no more interested in increasing bias than in increasing loan demand
Credit Constrained

Over Borrowing

Self Restrained

$1 - (Y - y)^{1/d}$
New Result: Market discipline

• When $1 < d < \frac{1}{1 - (Y - y)}$
  – Market provides some discipline
  – The borrower gets a loan smaller than how he would spend his own cash $L < Y - 1$

• Moreover notice that as cost of default $d$ diminishes...
  – The over-borrowing goes down
  – At one point the borrower is at the first best ($d = 1$)
Market Discipline

\[
\frac{\partial U^*}{\partial d} < 0 \quad \text{for} \quad 1 < d < \frac{1}{1 - (Y - y)}
\]

• When \(d\) high repayment ability independent of \(y\)
  — Lender’s profits independent of mis-forecast
• For modest \(d\) repayment ability depends on \(y\)
  — Lender now
• Scrutiny of repayment ability can help to reduce consumer biases
• The more difficult to default on credit the worse
Some observations

1. Internality not fully externalized
   - Pay until $u'(y-l) = d$
   - Overborrowing felt partly in default but partly in under-consumption tomorrow.
   - This internality not felt by lender
   - $d=1$ is coincidental knife edge case

2. Catering case is special case
   - Only when transactions are narrow.
   - Where there is little or externalization of internality
     - Gyms, Hotels (shrouded attributes),
Securitization

• Suppose that the originator of the loan is not fully incentivized
• Richer model would include three party contracting – owner of loan, originator and borrower
  – Would fully model incentive problem
• Let’s focus instead on a simple change:
  – The originator due to moral hazard gives more credit than he ought to
  – Borrower given credit up to $y-1/d + k$
Credit Constraint Eased

Rational Borrowers
Securitization

• Originator moral hazard
  – Perverse incentives on loan quality
  – Greater incentive to give out high default loans

• An effect on securities purchasers
  – For $d<1$, loans earn negative profits
  – Standard effect: pecuniary externality
  – They will trade off moral hazard against other benefits (e.g. diversification)
Securitization

- As far as borrower is concerned it is welfare enhancing
- Key cost of securitization (unmodeled here) is higher default rate
- But this is a pecuniary externality that loan owner would be contracted away (traded off against other gains)
Biased Borrowers

Overborrowing Exaggerated

Credit Constrain Eased
Securitization

• Originator moral hazard
  – Perverse incentives on loan quality
  – Greater incentive to give out high default loans

• An effect on securities purchasers
  – Standard effect: pecuniary externality
  – They will trade off moral hazard against other benefits (e.g. diversification)

• An effect on homeowners
  – Less of the internality is externalized
  – Overborrowing is exaggerated
The Mortgage Crisis

• Borrowers take loan to buy house
  – They must forecast how much home they can afford
  – Bias here is in borrower buying too big a home

• Securitization facilitated subprime borrowing
  – Expansion of credit

• In this view downside of expansion of credit
  – Borrowers could have been made worse off
  – No check on borrowers’ natural bias
Some observations

• Different picture if borrowers were *unbiased*
  – Would have provided second check on foreclosure/default
    • Especially for first time purchases, not as clear for refinance

• Securitization can change relationship between default rates and borrowers own skin in the game

• Micro model of Y (the error) could produce a feedback effect
  – Wtp for homes could depend on housing price trajectory
Student Loan Market

• Students must estimate value of schooling
  – Potential for bias here is clear

• Government covers 90% of the loan. Remaining 10% comes from another lender

• Note: Subsidy by government has perverse effect
  – Lowers incentives and thereby can worse schooling choices
  – As with securitization, a different consequence than in traditional model
Another Effect

• Who provides the 10%?
• Two kinds of players:
  – Independent third party lender
  – The school itself
Bundling

• When the lender is also a seller of the good purchased with the loan...
  – Greater willingness to lend (at higher default)
  – Exactly as in securitization case

• Can exaggerate over-borrowing
  – In a richer model, would produce worse schooling choices

• Data suggests that students borrowing bundled loan have much higher default rates
  – Some suggestive evidence that they may be making “worse” choices

• Other examples:
  – Buy here/pay here
Take Up Example

• Individuals fail to take up many government programs for which they are eligible
• Two examples:
  – College financial aid
  – Earned income tax credit
• Data suggests that both of these failures are at least partly behavioral
  – Bettinger et. al. - FAFSA
  – Bhargava and Manoli: EITC
  – Reducing “hassle costs” of take-up increases take-up
The Role of a Tax Preparer

• Program to sign up for
  – Benefit $b$ tomorrow. Cost of sign up $c$ today

• Utility $b-c > 0$
  – Myopic agents underweigh future benefits
    • Act as if $\beta < b$
  – Internality: $b-\beta$. Those with $\beta < c$ don’t sign up
Internality Externalized

• Tax preparer could offer upfront payment
• Would remove the internality
• Refund anticipation loan
When does this work?

• Tax preparer able to charge individuals *directly from the EITC refund*
  – Their profit depends on the internality (the benefit) and they can capture some of it

• This is only feasible because the government allows tax preparers to direct deposit refunds into their account
Rethinking Refund Anticipation Loan

• Traditional argument against
  – High interest, expensive loans
  – “Exploit” customers (we would say catering)

• This model suggests important twist
  – Limiting refund anticipation loans would *reduce* enrollment incentives for tax preparers
  – There is now a tradeoff
Rough Data

- The time series suggests an increase in EITC enrollment
- Correlational data suggests tax preparers are correlated with sign up
- Anecdotal evidence suggests outreach efforts high
Contrast with Financial Aid

• No direct way for the tax preparer to benefit from this

• Unlike EITC payments, the tax preparer cannot move the benefits up in time
  – No way to capture financial aid payments

• We see little effort by tax preparers to sign people up at scale
Take Up of Benefits

• Sign up by employers

• Sign up on Medicaid by hospitals
Other Policy Lessons

• Make subsidies “capturable” by firms
  – Example: Tax subsidy to 401(k) or IRAs

• Can sharpen targeting
  – Slight tweak to CAFE standards

• Create third party incentives
  – Example: Positive healthy behaviors.
  – Why on individuals and not on insurers?
Policy Approach

• Broad Implication:
  – Can correct internalities in a Pigouvian way

• Identify ways to incentivize firms with proxies for the internality

• Compare to the “nudge” approach
  – Governments create psychologically motivated policy levers (“nudges”) to debias
  – Problem: Firms can often nudge back
    • If the profit motive remains unchanged, firms can sometimes (often) work around nudge