Designing Optimal Defaults

Jacob Goldin\textsuperscript{1}  Daniel Reck\textsuperscript{2}

\textsuperscript{1}Stanford Law School

\textsuperscript{2}University of Michigan

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▶ This paper examines this problem for the case of default options.

▶ Retirement savings (Madrian and Shea, 2001; Choi et al 2004; Carroll et al 2009; Chetty et al 2014; Bernheim Fradkin Popov 2016)
▶ Privacy controls (Johnson et al 2002; Acquisti et al 2013)
▶ Health (Chapman et al. 2010)
▶ Student loan repayment
The Classical View

- Classic revealed preference theory equates choice with welfare
  \[
  c_i(X, S) = \arg \max_{x \in S} u_i(x)
  \]
  \[
  w_i = u_i(c_i(x, S))
  \]

- Can add prices, endowments, taxes, etc.

- Default not usually modelled
- Then default effects are observed
- Rationalization: modify (1) (add to \( S \), \( u_i(.) \))
- Psychological costs, transaction costs, switching costs, etc.

- Can always be done for any behavioral observation?
- But then does (2) still hold?
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Rationalizing Default Effects

\[ v_i(x(d), d) = u_i(x(d)) - \gamma_i 1\{x(d) \neq d\} \]  

\(\gamma_i\) is an "as-if" cost.
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- Are as-if costs true costs?
  - i.e. does \( w_i = v_i \)?
  - Some have proposed alternatives

▶ Yes: need a new rationalization for every behavioral finding
▶ But maybe the old normative model was correct?
▶ Leads to controversy over default policies
▶ Related problems for other behavioral phenomena
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This Paper

- Introduce a simple model of optimal defaults
  - *Parameterize* normative ambiguity

- Show that it nests several positive models

- Characterize welfare effects of default policies
  - Building towards sufficient statistics...

- Data?

- Lessons for other policy problems?
Part 1

A Simple Model of Defaults and Welfare
Setup

Behavior $x_i(d)$ given by:

$$\max_{x \in S} v_i(x, d) = u_i(x) - \gamma_i 1\{x \neq d\}$$
Setup

- Behavior \( x_i(d') \) given by:
  \[
  \max_{x\in S} v_i(x, d) = u_i(x) - \gamma_i 1\{x \neq d\}
  \]

- Welfare:
  \[
  w_i(x_i(d), d) = u_i(x_i(d)) - \rho_i \gamma_i 1\{x_i(d) \neq d\}
  \]

- \( \rho_i \in [0, 1] \): share of costs that are "normatively relevant."
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- Budget constraint (kinked in the 401(k) context)
- Taxes, dynamics, etc.
- Money metric
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- Utilitarian social welfare $W_i(d) = \int_i w_i(x_i(d), d) di$
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- Note: assuming a varily simple as-if cost function, could in principle be relaxed.
Part 2

Relationship to Positive Theory
Positive Theories: Classic Rationality

\[ \rho_i = 1 \text{ for all } i. \]
Positive Theories: Classic Rationality

\[ \rho_i = 1 \text{ for all } i. \]

\[ \Rightarrow \rho_i \leq 1. \]

\[ \quad \text{The end.} \]

\[ \quad \text{...but you could argue that part of } \gamma_i \text{'s are psychological costs, maybe should be discarded?} \quad \Rightarrow \quad \rho_i \leq 1. \]
Positive Theories: Present Bias (Q-HD, Laibson 1997)

- Present bias can magnify small up-front costs (Carrol et al 2009)
- Costs incurred now, benefits in future, discounted by $\beta_i$
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  \beta_i u_i(x) - \gamma_i I\{x_i \neq d\}
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- Note: classical discounting ($\delta_i$) suppressed in $u_i$
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  \[ \beta_i u_i(x) - \hat{\gamma}_i 1 \{x_i \neq d\} \]

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  \[ \gamma_i = \frac{\hat{\gamma}_i}{\beta_i} \]

- Long-run ($\beta = 1$) view of welfare: $\rho_i = \beta_i$. 
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- Long-run ($\beta = 1$) view of welfare: $\rho_i = \beta_i$.
- Short-run view of welfare: $\rho_i = 1$.
- Note: with the right variation, $\delta_i, \beta_i$ are identified, but the "right" view of welfare is still unknown.
Positive Theories: Anchoring/Status Quo

- Give extra utility $\omega_i$ to default option:
  \[ v_i(x, d) = u_i(x) + \omega_i 1\{x_i \neq d\} \]

- Assumes no spillovers to "near-default" choices
- Consistent with aggregate evidence on 401k
- Could relax with more sophisticated as-if cost function
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- Many think $\rho_i = 0$, one could argue otherwise (was default deliberately chosen?)
Positive Theories: Inattention

- Attention filter: $\Gamma_i(d) \subseteq S$ (Masatlioglu et al, 2012)
- Behavior: $\max_{x \in \Gamma_i(d)} u_i(x)$
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- Assume $\Gamma_i(d) \in \{\{d\}, S\}$
  - Could be relaxed with more sophisticated cost function?

Rationally chosen with full information
$\rho = 1$

A planner-doer model (Fudenberg and Levine, 2006)

Normatively equivalent to neoclassical model

Exogenous

Two types: either $\gamma_i$ is arbitrarily large or $\gamma_i \approx 0$.

$\rho_i$ becomes irrelevant to policy/behavior

Contradicted by aggregate data on 401k.

Rationally chosen with less than full information??

$\rho_i$ depends on how accurate beliefs are?

Some $\rho_i > 1$?
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- Endogenize $\Gamma_i$ to close the model:
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Takeaways

- This simple framework nests many positive models

- Models differ by $\rho_i$’s

- Could easily combine some of these models.

- $\implies$ At least any value $\rho \in [0, 1]$ is plausible, maybe even $\rho > 1$. 
Part 3

Characterizing Optimal Policy
Binary Case

- Consider a fixed binary menu $S = \{0, 1\}$

- Monotonicity: $\gamma_i \geq 0$ for all $i$ implies $(x_i(0), x_i(1)) \neq (1, 0)$

- Let $\Delta u_i = u_i(1) - u_i(0)$
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Proposition:

\[ W(1) - W(0) = E[\rho_i \gamma_i|1, 1]p_{11} - E[\rho_i \gamma_i|0, 0]p_{00} + E[\Delta u_i|0, 1]p_{01} \]
Binary Case

Proposition: Suppose

- $\rho_i \gamma_i \perp \Delta u_i$.
- the distribution of $\Delta u_i$ is single peaked and symmetric.

Then $p_{11} > p_{00} \iff W(1) \geq W(0)$

Remarks

- Doesn’t depend on $\rho_i$: normative ambiguity only if above assumptions fail
- Assumptions are unrealistic but often assumed for tractability
- Minimizing opt-outs (Thaler and Sunstein 2003)
- Easily conditioned on observables
- Assumptions testable/relaxable with the right data
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- Minimizing opt-outs (Thaler and Sunstein 2003)
- Easily conditioned on observables
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- Size of $W(1) - W(0)$ does depend on $\rho$
Building Toward the General Case

- Consider a fixed arbitrary menu $S$
- Define *active choosers* at default $d$:

$$a_i(d) = 1\{x_i(d) \neq d\}$$

Identification: $a_i(d) = 1 \Rightarrow x_i(d) = x_i^*$

Falsifiable for any $i$ with ideal dataset
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- Identification:
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- Falsifiable for any $i$ with ideal dataset
When Might $\rho_i$ Matter For Policy?

Case 1: Active choices:

- Suppose there is a default $d^A$ that is so bad that $a_i(d') = 1$ for every $i$ (Carroll et al 2009)

- Further suppose $\rho_i = 0$ for all $i$. 

Then $d^A$ is plainly the optimal default.

However, when $\rho_i > 0$ and $\gamma_i$ is large, this will tend to fail.

Case 2: Uniform preferences:

- Suppose for all $i$, $x^*_i = x$ for some $x \in S$.

Then $d = x^*_i$ is plainly the optimal default, regardless of $\rho_i$. 

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Case 2: Uniform preferences:

► Suppose for all $i$, $x_i^* = x$ for some $x \in S$.

► Then $d = x_i^*$ is plainly the optimal default, regardless of $\rho$. 
Some intuition

Normative ambiguity appears to occur when

- $\gamma_i$ is large,
- the space of possible defaults ($S$) is rich, and/or
- optimal choices ($x_i^*$) are more heterogeneous.
Effect of a Change in the Default

Consider two defaults: \((d_0, d_1)\). Define:

- **Always active (AA)**: \(a_i(d_0) = a_i(d_1) = 1\)
  \[ u_i(x^*) - \max\{u_i(d_0), u_i(d_1)\} \geq \gamma_i \]

- **Always passive (AP)**: \(a_i(d_0) = a_i(d_1) = 0\)

- **Become passive (BP)**: \(a_i(d_0) = 1; a_i(d_1) = 0\)

- **Become active (BA)**: \(a_i(d_0) = 0; a_i(d_1) = 1\)
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- **Become passive (BP):** \(a_i(d_0) = 1; \ a_i(d_1) = 0\)
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  u_i(x^*) - u_i(d_1) < \gamma_i < u_i(x^*) - u_i(d_0)
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- **Become active (BA):**
  \[
  a_i(d_0) = 0; \ a_i(d_1) = 1 \\
  u_i(x^*) - u_i(d_0) < \gamma_i < u_i(x^*) - u_i(d_1)
  \]
The Welfare Effect of a Default Change

Proposition:

\[ W(d_1) - W(d_0) = E[u_i(x^\ast) - u_i(d_0) - \rho \gamma_i|BA]p_{BA} \]
\[ - E[u_i(x^\ast) - u_i(d_1) - \rho \gamma_i|BP]p_{BP} \]
\[ + E[u_i(d_1) - u_i(d_0)|AP]p_{AP} \]

Remarks:

▶ Welfare of AA group is irrelevant
▶ Need to further characterize when \( sign(W(d_1) - W(d_0)) \) depends on \( \rho \)’s.
▶ Intuitively \( \rho \) will only matter if BA and BP have very different \( \gamma \) or \( u \).
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Proposition:

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Welfare Effect of a *Marginal* Default Change

- Suppose $S = [a, b] \subseteq \mathbb{R}$
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- Can prove a similar proposition to before with $\left. \frac{du_i}{dx} \right|_{x=d}$ symmetric, single-peaked, independent of $\rho_i, \gamma_i$. 
CONJECTURES

When does \(\text{sign}(\Delta W)\) depend on \(\rho_i\)'s?

- when \(\Delta u_i\) has a highly asymmetric distribution, and
- when \(\gamma_i\)'s are large and correlated with \(\Delta u_i\)
- when \(\text{sign}(\Delta W_{BA} + \Delta W_{BP}) \neq \text{sign}(\Delta W_{AP})\)

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When is $|\Delta W|$ invariant to $\rho$? Never.

Identifying distribution of $\gamma_i, u_i(\cdot)$ (parameterized) is a tractable RP problem

- but no model can identify $\rho$.
- Components of $\gamma$ might be separated empirically, e.g. present bias,
- but discarding some of them still requires normative judgement.
Part 4

Conclusions
Optimal Policy and Normative Ambiguity

► When $\rho$ is irrelevant for policy

► e.g. kinks in budget for 401(k) $\implies$ optimal default will tend to be at 0 or max employer match (Bernheim Fradkin Popov 2015).

► Thus Bernheim and Rangel’s (2009) welfare criterion resembles robustness a la Hansen and Sargent (2016).

► But beware: seemingly innocuous structural assumptions can cause this to happen unintentionally.

► When $\rho$ does matter for optimal policy

► Then setting an optimal default requires a normative judgement

► Usually we leave these judgements to policymakers

► But we can still tell policymakers about the map from $\rho$’s to optimal policy.

► e.g. if you think $\rho=0$, maximizing active choices looks great; if you think $\rho=1$, maybe minimize opt-outs.
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Does this sound familiar?

Public economics employs two types of optimal policy analysis

- Efficiency arguments (Kaldor, 1939; Hicks, 1939, 1940)
  - Take no stand on whose utility matters more.
  - Revealed preferences alone are sufficient.

- Equity-efficiency tradeoffs (Mirrlees, 1971)
  - Requires a normative judgement re: the value of equity, often parameterized (see e.g. Saez, 2001)
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Can a similar distinction lead to a broad consensus about optimal defaults...about behavioral welfare ecooomics?
Where to next?

- Fill in the gaps in the above, esp if "sufficient statistics" can be derived.
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- Generalizations:
  - Express "true" welfare as a weighted sum of utility functions that rationalize behavior in different frames, weights $\equiv \rho$. 

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- Generalizations:
  - Express "true" welfare as a weighted sum of utility function that rationalize behavior in different frames, weights \( \equiv \rho \).
  - Temptation: \( u \) vs \( u + v \)
  - Present bias: \( \beta = 1 \) and \( \beta < 1 \)
  - Gain/loss framing? Others?
THANK YOU!

Questions/comments: dreck@umich.edu
Defaults with richer choice sets: Application

- Aggregate data from Bernheim et al (2016)
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- 15% max contribution
- Large kink at 6% from 1:1 employer match
Defaults with richer choice sets: Aggregate data

![Contribution rates under alternate defaults](chart.png)

- back to anchoring
- back to next steps
Defaults with richer choice sets: Identified distributions
Defaults with richer choice sets: Identified distributions

Aggregate Preferences of 'Ever Active' Choosers

![Chart showing data analysis on 'Ever Active' choosers preferences.](chart.png)