

Behavioral Economics of Taxation

OFFICE OF TAX POLICY RESEARCH SHORT COURSE
NATIONAL TAX ASSOCIATION ANNUAL MEETINGS 2019

Introductions

About me:

Associate Professor of Economics

Cornell University

Primary training:

Behavioral economics

Most specifically: interested in improving policy analysis by better accounting for more psychological elements driving behavior.

Introductions

Motivation for a behavioral economist to jump to public finance:

Behavioral econ has succeeded on many fronts.

- Enormous amount of support from lab experiments.
- Broad success in reducing ideological opposition to the importance of mistakes.
- Shorter, but still impressive, list of field applications.

That said, as of 2010: relatively few policy domains where behavioral ideas had fundamentally shaped our approach to the problem.

- Retirement savings/default effects, ... (list is longer today)

Understanding interactions with taxes seemed to me to be the important economic domain most likely to have a central role for “behavioral” ideas.

- Taxes are often extremely complex + easily misunderstood or ignored.
- Very strong intuitions that we don’t fully optimize, and that this *matters*.

Overview

Goal for today:

Highlight a few domains where I see behavioral economics making meaningful contributions to Public Finance.

Target audience:

Individuals interested in tax policy research with little behavioral economics background.

Topic overview



Tax
salience

Optimal
taxation

Tax
compliance

Disclaimer: much too much material to cover in 90 minutes.

Consequence: presentation is nowhere near a thorough review.
Aimed to convey themes and help guide you to relevant papers.

Tax salience



Why tax salience?

Great example of a fundamentally obvious “behavioral” behavior. Oversimplified version:

- Price tags in the U.S. are lies.
- Unsurprising basic insight: “lying to people misleads them.”
- And yet: consequences of this behavioral badly violate assumptions of full optimization.

Central papers in literature.

- Chetty, Looney, Kroft (2009) meaningfully kick-started a wave of behavioral PF.
- Directly motivated many papers, indirectly influenced many more.
- Paved the way for “behavioral sufficient statistics” approaches.

Chetty, Looney, and Kroft (2009)

Central assumption of neoclassical model: taxes are equivalent to prices.

In practice, are people aware of marginal tax rates? Do they attend to them?

CLK test this assumption and generalize theory to allow for salience effects.

Tested in two domains:

1. Experiment in a grocery store.
2. Examination of alcohol demand response to excise and sales taxes.

Chetty et al.: Empirical Framework

Goods: x and y .

Prices: normalize price of y to 1 and let p denote the pretax price of x .

Taxes: y untaxed, x subject to ad valorem sales tax such that true price = $(1 + \tau)p$

Key “new” theoretical object: generalized demand function $x(p, \tau)$.

Chetty et al.: Empirical Framework

If agents optimize, demand only depends on the tax-inclusive price:

$$x(p, \tau) = x((1 + \tau)p, 0)$$

Means of testing: $\log(x(p, \tau)) = \alpha + \beta \log(p) + \theta \beta \log(1 + \tau)$

θ measures the demand elasticity with respect to the tax rate as a fraction of the demand elasticity with respect to the posted price. If rational, $\theta = 1$. If inattentive, $\theta = 0$.

Approaches to testing:

1. Experimentally move the tax into the posted price.
2. Examine variation in both components driven by state-level tax changes.



Experimental setting:

Grocery store in CA

~30% of products sold in store
subject to sales tax

Treatment group:

Cosmetics

Deodorants

Hair care accessories

Relevant comparisons:

Same products before experiment.

Other products in the same aisle.

Behavior in two nearby stores.

Data source:

Scanner data on weekly price and
weekly quantity sold.

Effect of Posting Tax-Inclusive Prices: Mean Quantity Sold

TREATMENT STORE			
Period	<u>Control Categories</u>	<u>Treated Categories</u>	<u>Difference</u>
Baseline	26.48 (0.22)	25.17 (0.37)	-1.31 (0.43)
Experiment	27.32 (0.87)	23.87 (1.02)	-3.45 (0.64)
Difference over time	0.84 (0.75)	-1.30 (0.92)	DD _{TS} = -2.14 (0.64)
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DDD Estimate			-2.20 (0.58)

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Bottom-line

Tax-inclusive pricing resulted in a decline in quantity demanded.

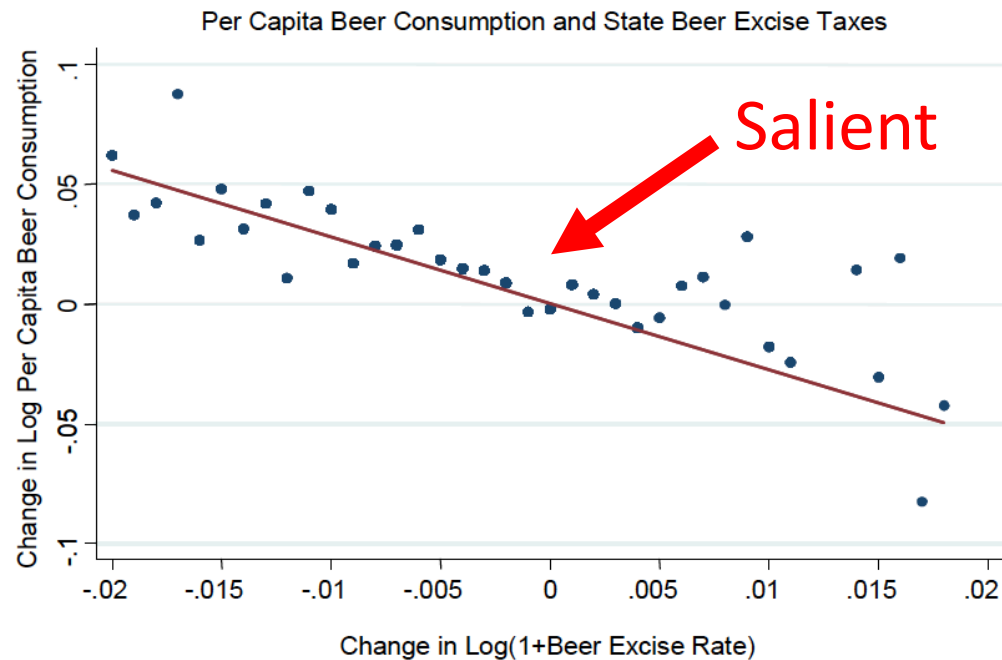
Consistent with average underestimation of total price prior to intervention.

Estimated $\theta = 0.35$.

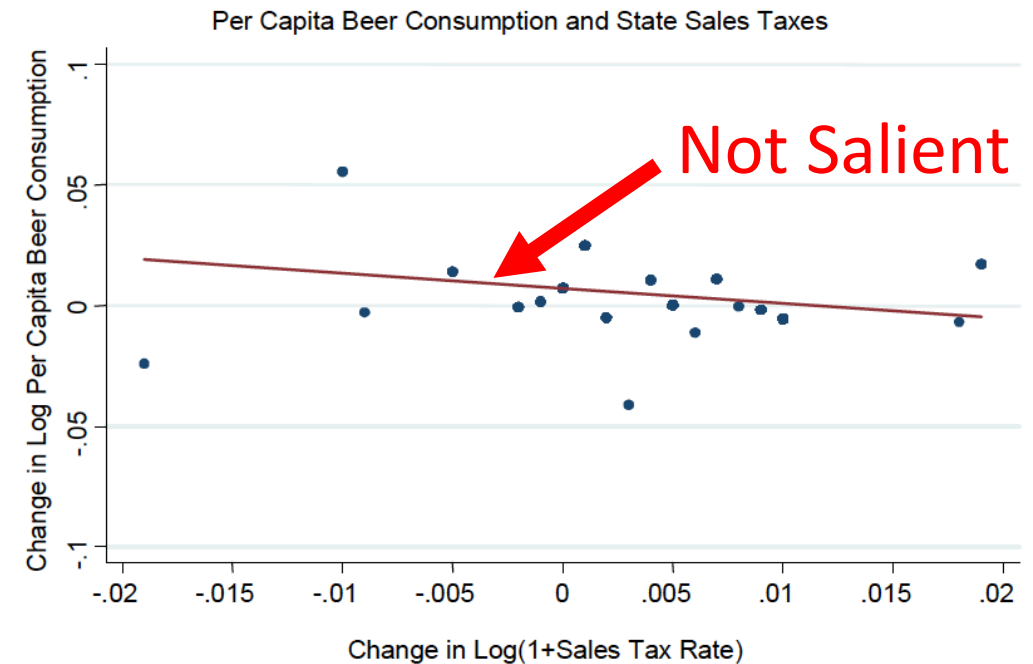
Of course, there are criticisms:

1. At least slightly unnatural manipulation.
2. Hawthorne effects: alternation of behavior due to awareness of being observed.

Second exercise partially addresses these worries.



Source: Chetty, Looney, and Kroft (2009)



Source: Chetty, Looney, and Kroft (2009)

Data: state level annual beer consumption, 1970-2003.
Merged with state-level excise and sales tax rates.

Regression estimates suggest: $\theta = 0.06$ (imprecisely estimated).

Key implication: deadweight loss

Presence of salience modifies the fundamental evaluation of the social costs of taxation.

Typical worry: distortionary incentives of taxes.

Non-distortionary ideal: lump-sum taxation.

Basic intuition: if you ignore the tax, it operates like a lump sum. Great! (?)

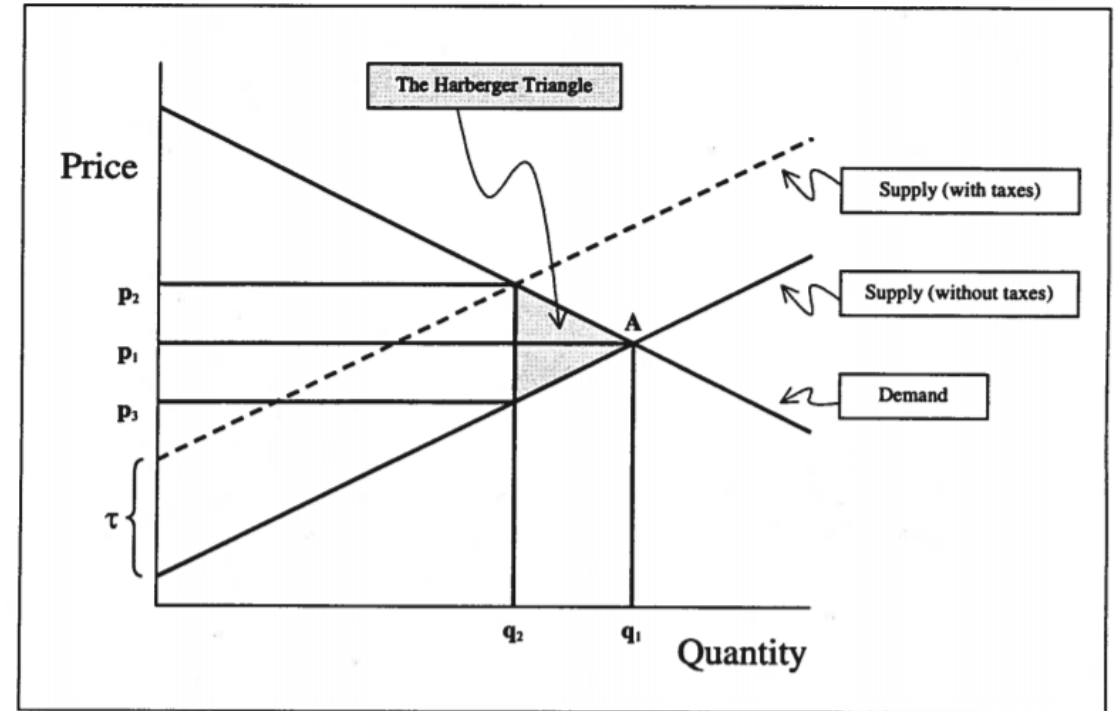


Figure 1: The Harberger Triangle

Source: Hines Jr. (1998)

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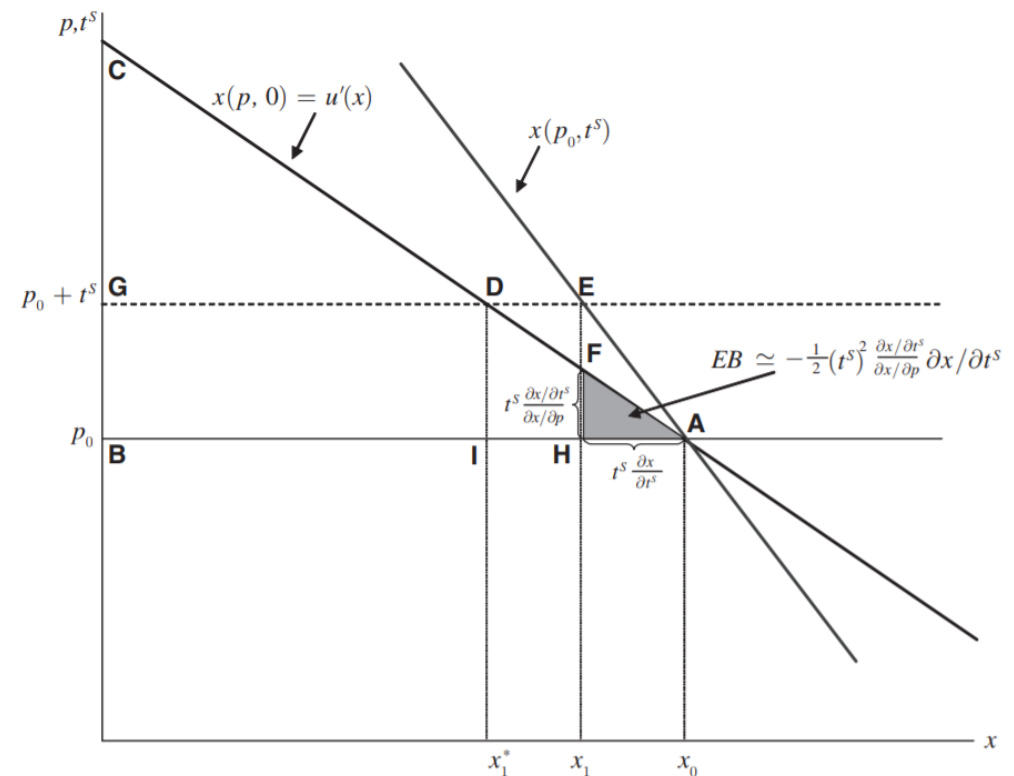


FIGURE 4. EXCESS BURDEN WITH NO INCOME EFFECT FOR GOOD x ($\partial x / \partial Z = 0$)

Source: CLK (2009)

Should we like non-salient taxes?

CLK is often used to advance the argument that non-salience is expected to be “good.”

While the paper itself is fantastic, I think that particular argument is often overstated.

- Note: not overstated by the authors themselves.

Several additional considerations:

1. How is the budget constraint satisfied? (Reck, 2016)
2. What are the redistributive consequences? (Goldin and Homonoff, 2013)
3. What if there is variance in attention? (Taubinsky and Rees-Jones, 2018)

Lasting impact of the salience literature

Served as a case study for conducting behavioral economics in the PF framework.

Prior behavioral literature: often reads as if we need new tools for policy analysis.

Through the salience literature, we slowly rediscovered the wheel:

- Distortionary considerations, redistribution, allocative efficiency.

Not revolutionary ideas for PF people, but relatively “new” in the nudge literature.

Optimal taxation

Optimal taxation

Large literature in economics aims to assess how taxes *should* be structured.

Work-horse versions face a relatively simple tension. A social planner:

1. Needs revenue for, e.g., redistribution or public goods.
2. Wants to minimize the costly distortions of behavior induced by generating that revenue.

Tradeoffs like this are considered through the lens of an interaction between a social planner and a rational (and indeed, at times hyper-rational) population of taxpayers.

Potential for behavioral modifications

Rejections of completely perfect optimization abounds. People:

1. Have trouble reporting their own tax rates. (e.g., Fujii and Hawley 1988)
2. Misinterpret nuanced changes to tax credits. (e.g., Miller and Mumford 2015)
3. Do not optimally account for kinks in the EITC. (e.g., Chetty et al. 2013)
4. React to average tax rates when they should not. (e.g., Feldman et al. 2016)
5. Fail to take up social benefits distributed through tax law (e.g., Bhargava and Manoli 2015)
6. Leave money on the table due to hassle costs. (e.g., Benzarti 2016)

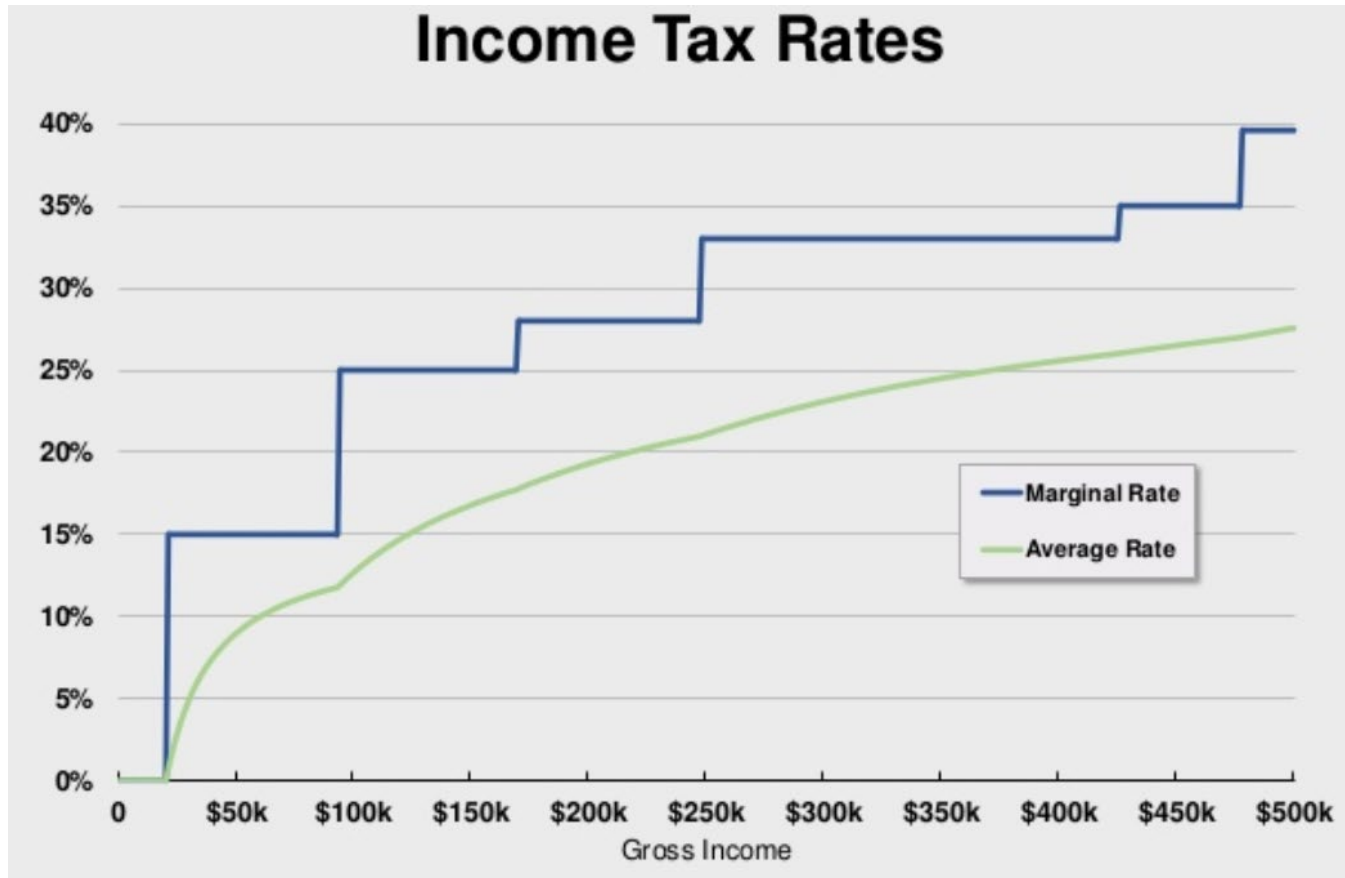
Should we care about mistakes?

Just because the assumption of optimization isn't perfect, that does not mean we should abandon it.

Optimal tax theory is hard enough as is: if mistakes make it intractable, they can and should be left out.

However, if mistakes can be measured thoroughly, tractably incorporated into theory, and result in meaningful insight, then we should *obviously* incorporate them when possible.

Case study for today: misunderstanding of non-linear tax schedules.



Married filing jointly, 2014.

For some, working with this schedule might be challenging.

Easy version: know your bracket, remember the number.

Reasons for difficulty:

Uncertainty re. income or tax status.

Innumeracy.

Salience.

Lack of feedback.

Popular heuristic account: “Schmeduling”

Liebman and Zeckhauser (2004) formalize two ways in which someone could simplify the problem. One of them has a lot of support and intuitive appeal: **Ironing**.

Ironing: substituting your average tax rate for your marginal tax rate. Rationale:

- Knowing your marginal tax rate requires a bit of work.
- In contrast, your average tax rate is very salient on most pay stubs.

Note: In general, your ATR is less than your MTR, so this would lead you to overestimate marginal returns to labor.

Ideal means of testing

Question: How can we test for ironing?

One possibility: have people make forecasts of the taxes due for different income amounts.

- Applied in Rees-Jones and Taubinsky (forthcoming): suggests around 40% of people iron.

Another possibility: find a field setting where ATR is randomly varied, holding MTR fixed.

- Applied in Feldman, Katuscak, and Kawano (2016).

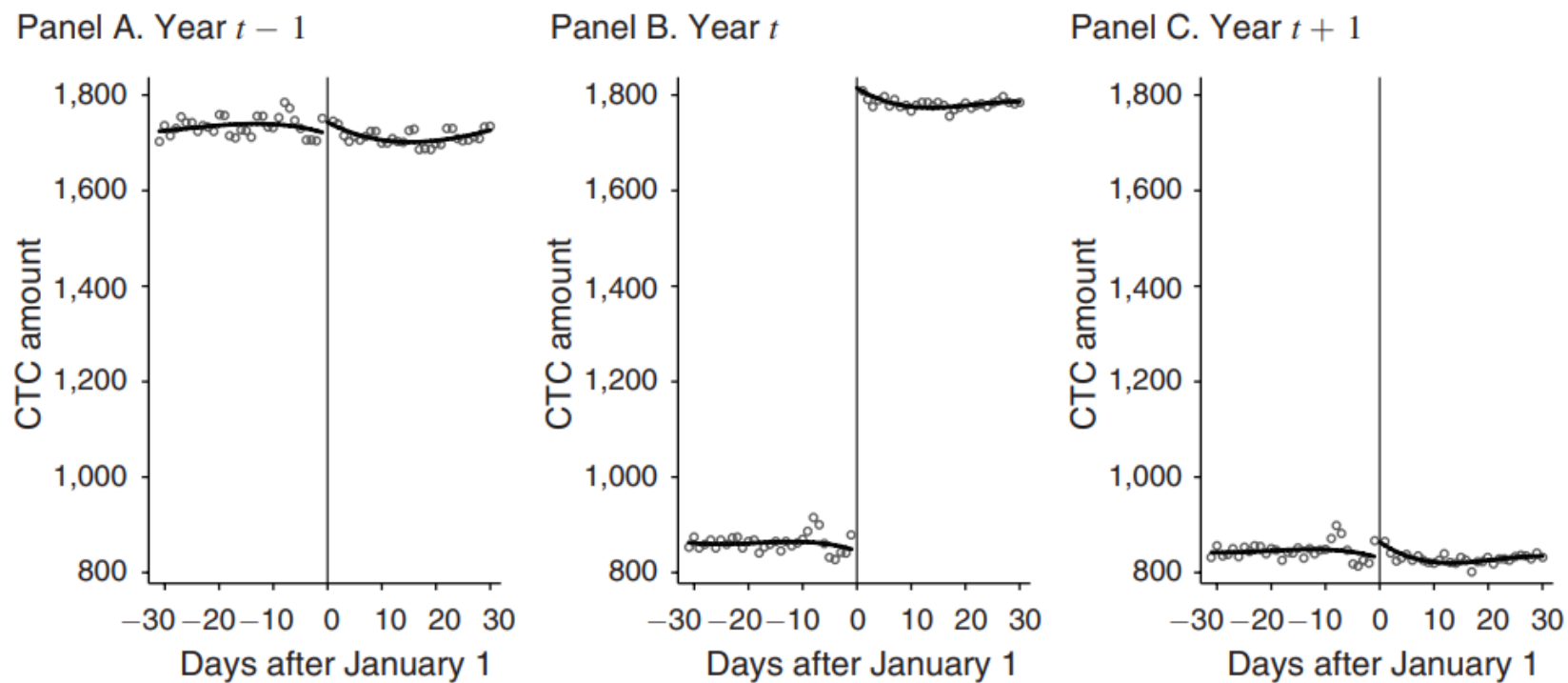


FIGURE 2. CTC AMOUNTS CLAIMED, BY DAY OF BIRTH

Notes: The figure presents the average amount of the CTC claimed by calendar day. Circles plot day-of-birth cell means of CTC amounts, and the solid lines plot cubic polynomials of the running variable, defined as the number of days after January 1, on each side of the discontinuity. The vertical line represents January 1, the date of birth that separates the treatment and control groups.

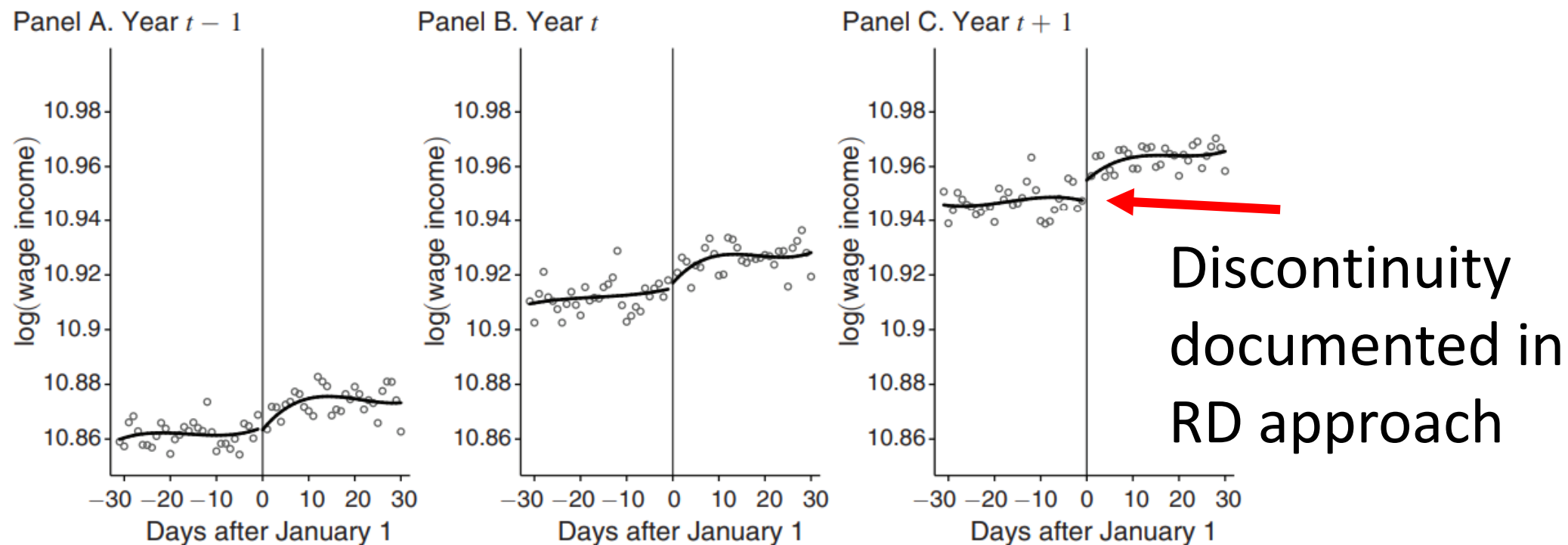


FIGURE 3. AVERAGE LOG WAGE AND SALARY INCOME, BY DAY OF BIRTH

Notes: The figure presents the average log wage and salary income by calendar day. Circles plot day-of-birth cell means of log wage income, and the solid lines plot cubic polynomials of the running variable, defined as the number of days after January 1, on each side of the discontinuity. The vertical line represents January 1, the date of birth that separates the treatment and control groups.

Implications

If people iron, and determine labor supply based on that forecast, it implies:

1. They work a bit more than they should, given their underestimation of disincentives.
2. Mistake generates a fiscal externality: because they work too much, it generates govt. rev.
3. This extra govt. rev. is generally raised somewhat progressively.

Rees-Jones and Taubinsky (forthcoming) simulate the consequences of 40% ironing.

- Baseline estimate: 2.5% increase in tax revenue.
- Not meaningfully offset by the costs of optimization errors.
- Additional motive to avoid going to “flat taxes.”

Optimal taxation more broadly

The literature on behavioral optimal taxation is much larger than “scheduling.”

In general, we now have reasonable portable and worked-out frameworks for doing these assessments for your candidate heuristic or bias of interest.

Very important paper: Farhi and Gabaix (forthcoming).

Solves for general “behavioral sufficient statistics” formulas for Ramsey, Pigou, and Mirrlees.

If you want to work in this area, you need to work through that paper.

Tax Compliance

Tax compliance

Topic of tremendous interest among tax-policy aficionados.

Literature may be considered an “early adopter” of behavioral ideas.

The problem: credibly studying tax avoidance and evasion is extremely challenging.

Consequence: the compliance literature could not compellingly study many psychological elements until relatively recently.

- Literature is now thriving.

An informal history

Much modern public finance: *obviously* all tax decisions should be modeled as optimal.

Economists in the 1960s: maybe people think about taxes a little bit?

- Enrick (1963, 64); Wagstaff (1965); Brown (1968).

Enormous, lasting advancement: Allingham and Sandmo (1972) model of tax evasion.

- Key idea: apply Becker-style analysis of crime to tax crime.

Allingham-Sandmo model

Taxpayer chooses amount of income to underreport (X) to maximize:

$$E[U] = (1 - p)U(W - \theta X) + pU(W - \theta X - \pi(W - X))$$

- θ : tax rate
- π : penalty rate
- W : wealth
- p : audit probability

Interior solution if:

$$p\pi > \theta \left[p + (1 - p) \frac{U'(W)}{U'(W(1 - \theta))} \right]$$

$$p\pi < \theta$$

Comparative statics:

- More audits, less evasion.
- Higher penalty, less evasion.

Strange implication 1

Why does anyone pay taxes at all?

Crude example: Say your ATR is .1, audit rate is 1.3%, and penalty rate is 2.

Cheating sounds like a pretty good deal! (Note: this is not legal advice.)

Motivated a large literature on *stigma* of tax evasion. Basic idea: penalty is larger than the financial costs.

Evasion by source

AS model abstracts from several important practical dimensions.

One major one: audit probability depends on *type* of evasion.

Most predictive factor: third-party reporting.

Bottom line: if I lie about my income, my audit rate is not 1.3%. It's 100%.

Components of the 2001 U.S. Federal Tax Underreporting Gap

	<i>Tax gap (\$billion)</i>	<i>Percentage of amount that should have been reported/filed/ paid/collected</i>
Gross tax gap	345	16.3
Underreporting	285	13*
<i>Individual Income Tax</i>	197	18
<i>Underreported nonbusiness income</i>	56	4
Wages and salaries	10	1
Net capital gains	11	12
Taxable pension annuities, IRA distributions	4	4
Taxable interest and dividends	3	4
Other	28	n.a.
<i>Underreported business income</i>	109	43
Nonfarm proprietor income	68	57
Partnership, S corporation, estate, and net trust income	22	18
Rent and royalty net income	13	51
Farm net income	6	72
<i>Overreported Offsets to Income</i>	15	4
Deductions	14	5
Exemptions	4	5
Other adjustments	-3	-21
<i>Overreported Credits</i>	17	26

Source: Slemrod (2007)

Strange implication 2

Common intuition: when taxes are higher, people are more motivated to evade.

AS result: not necessarily, results are ambiguous.

And it gets worse: Yitzhaki (1974) reconsiders model with one tweak.

- Original model: penalty proportional to underreported income.
- Yitzhaki's modification: penalty proportional to evaded tax.

New result: unambiguous prediction. Higher tax, less evasion.

Bottom line

Allingham-Sandmo model yields a few sensible predictions, but also poses more questions.

Begs the question: how rational is compliance or evasion?

Based on the papers written at the time, it appears that people were already thinking pretty behaviorally by the 80s at least.

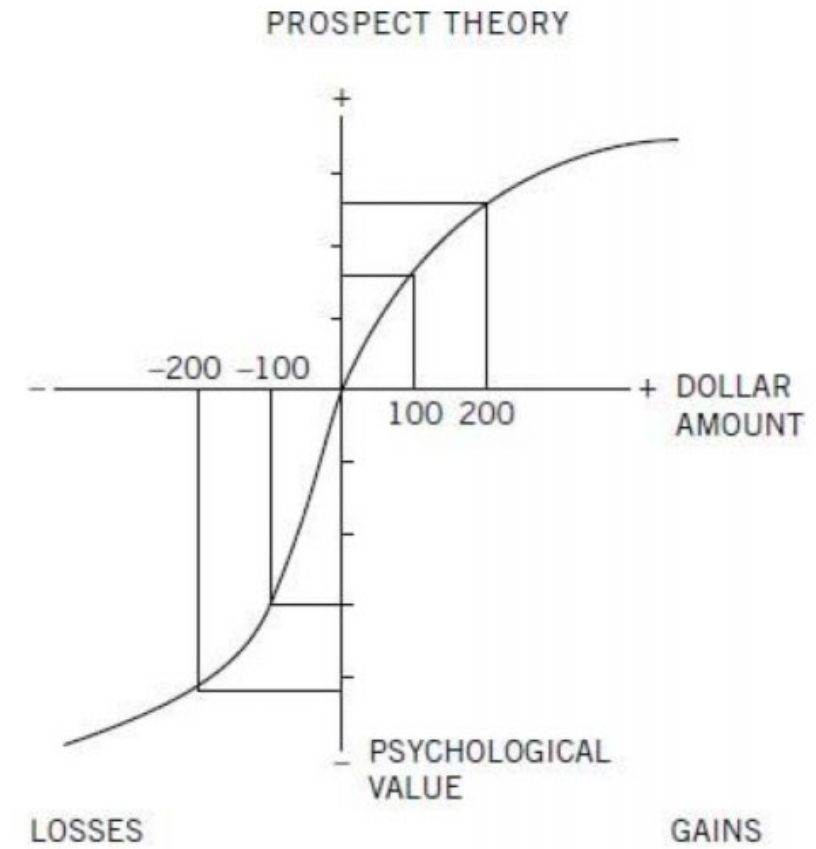
Concurrent development: Prospect Theory

1979: Econometrica publishes its most cited article: Prospect Theory.

Basic idea: decisions are made over relative, not absolute, amounts.

Additional components:

- Loss aversion
- Diminishing sensitivity
- Probability weighting



Tax applications quickly followed

Many experiments: Carroll (1992), Chang et al. (1987), Kirchler and Maciejovsky (2001), Robben et al. (1990), Robben et al. (1990), Schadewald (1989), Schepanski and Shearer (1995).

General finding: in the lab, individuals often act in accordance with predictions of loss aversion.

Many theoretical developments: Elffers and Hessing (1997), Yaniv (1999), Bernasconi and Zanardi (2004), Kanbur et al. (2008), Dhami and al Nowaihi (2007, 2010), Piolatto (2017).

General findings: PT can help explain voluntary compliance and Yitzhaki puzzle (with caveats).

The difficulty of testing prospect theory

Progress in tax applications mirrored the progress in other domains.

Barberis (2013):

Prospect theory is ... widely viewed as the best available description of how people evaluate risk in experimental settings.

...

It is curious, then, that so many years after the publication of the 1979 paper, there are relatively few well-known and broadly accepted applications of prospect theory in economics.

Testing PT in tax data

Since 2013, there has been reasonably rapid progress showing applications of prospect theory in important field domains, with tax compliance front-and-center.

We'll focus on two field studies:

1. Engström, Nordblom, Ohlsson, and Persson (2015)
 - First solid demonstration of tax-loss-aversion in field data.
2. Rees-Jones (2018)
 - Development of sufficient statistics approach to measuring impact.



Taxes due	30,000 SEK
Withholdings	29,000 SEK
Balance due	1,000 SEK

30,000 SEK
31,000 SEK
-1,000 SEK

Who cares more about reducing their tax?

Engström et al. (2015)

Formally test comparisons like the prior example in administrative tax data.

Data: 3.6 million Swedish tax filers (2006).

Target behavior: deduction for “other expenses for earning employment income.”

Approach: formalize the predictions of PT, test for their presence.

Theoretical approach

Three key pieces:

- Preliminary deficit: D
- Deduction: δ
- Cost of claiming: c

Decision rule: claim deduction if

$$V(-D) < v(t\delta - D) - c$$

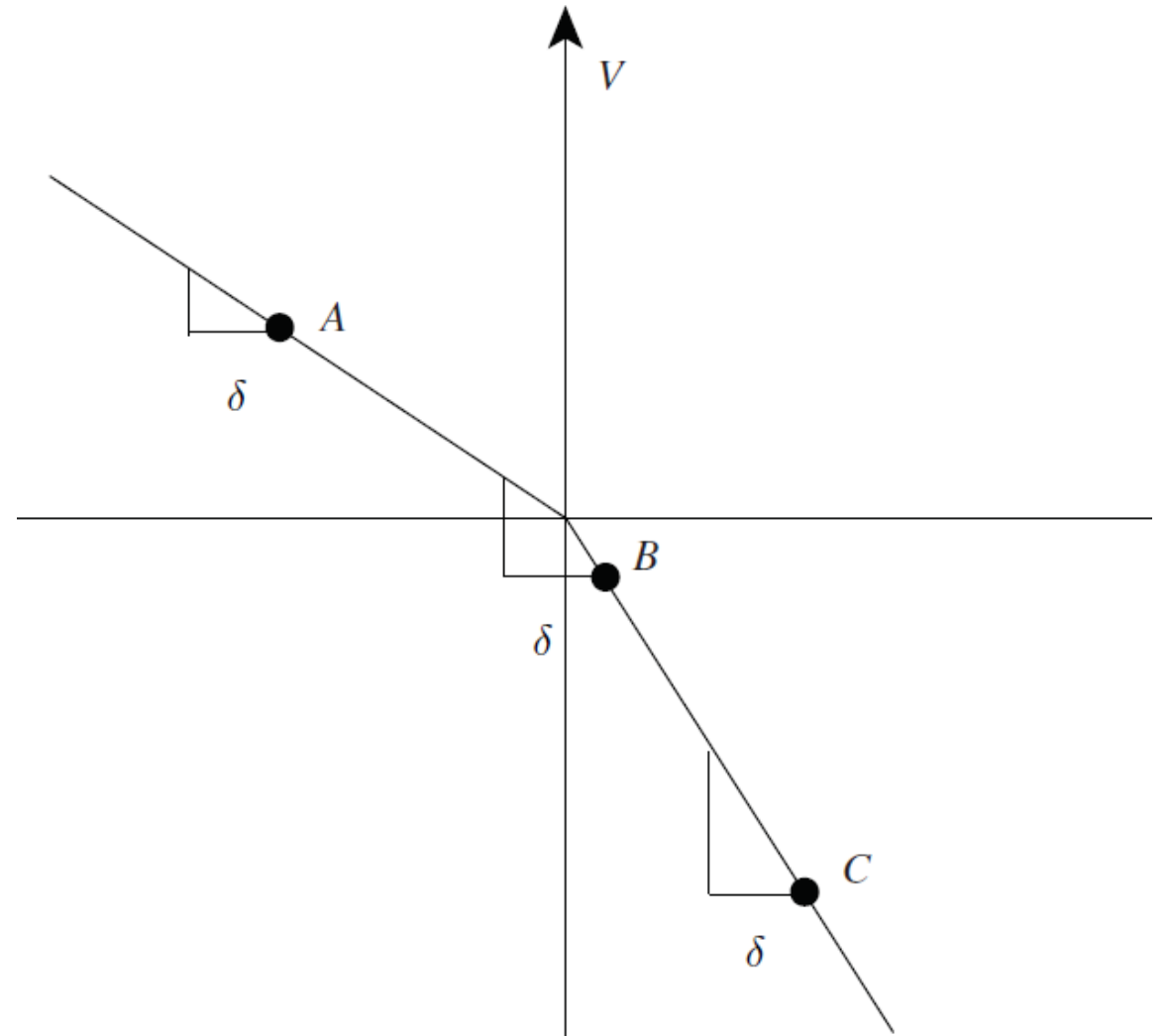
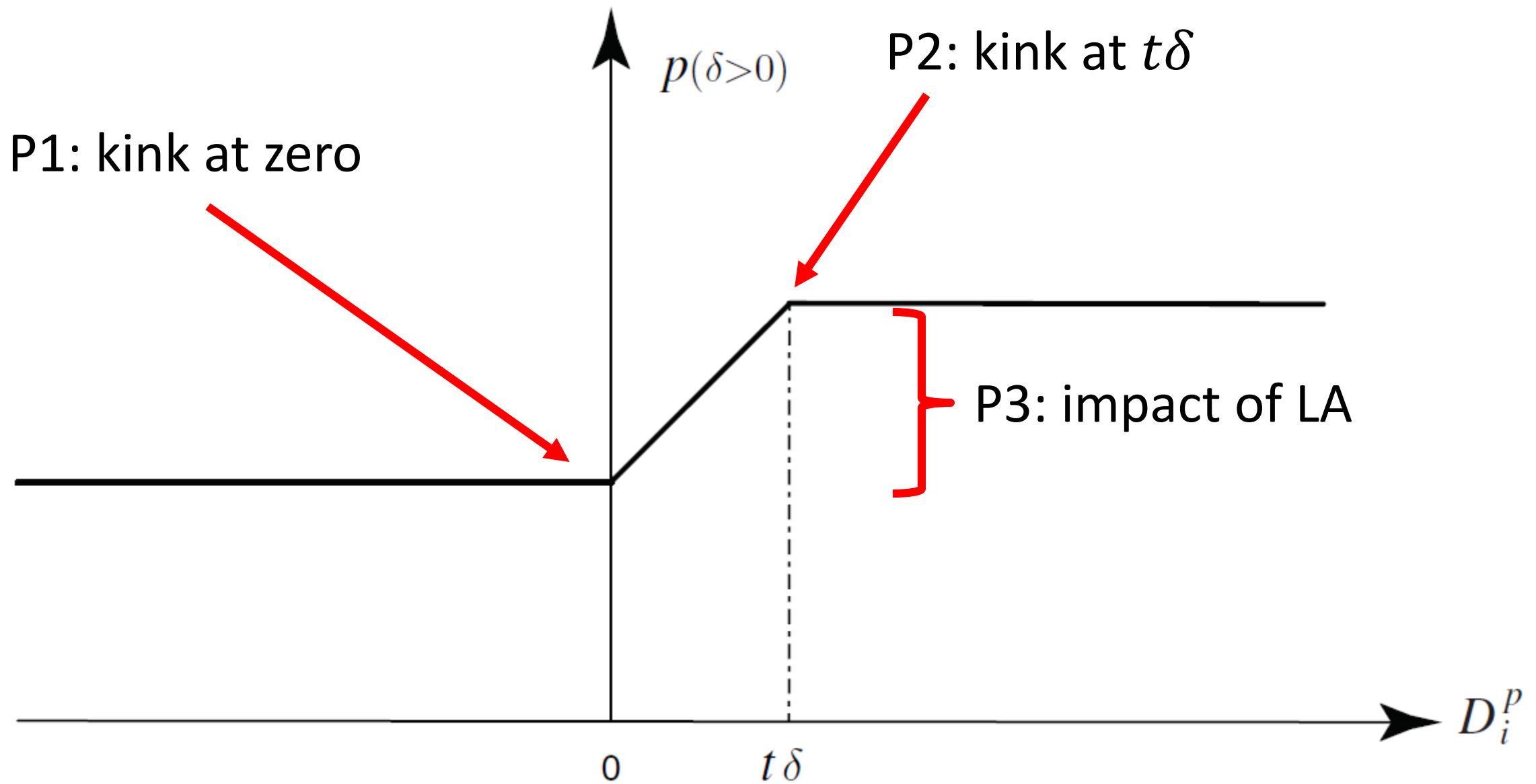
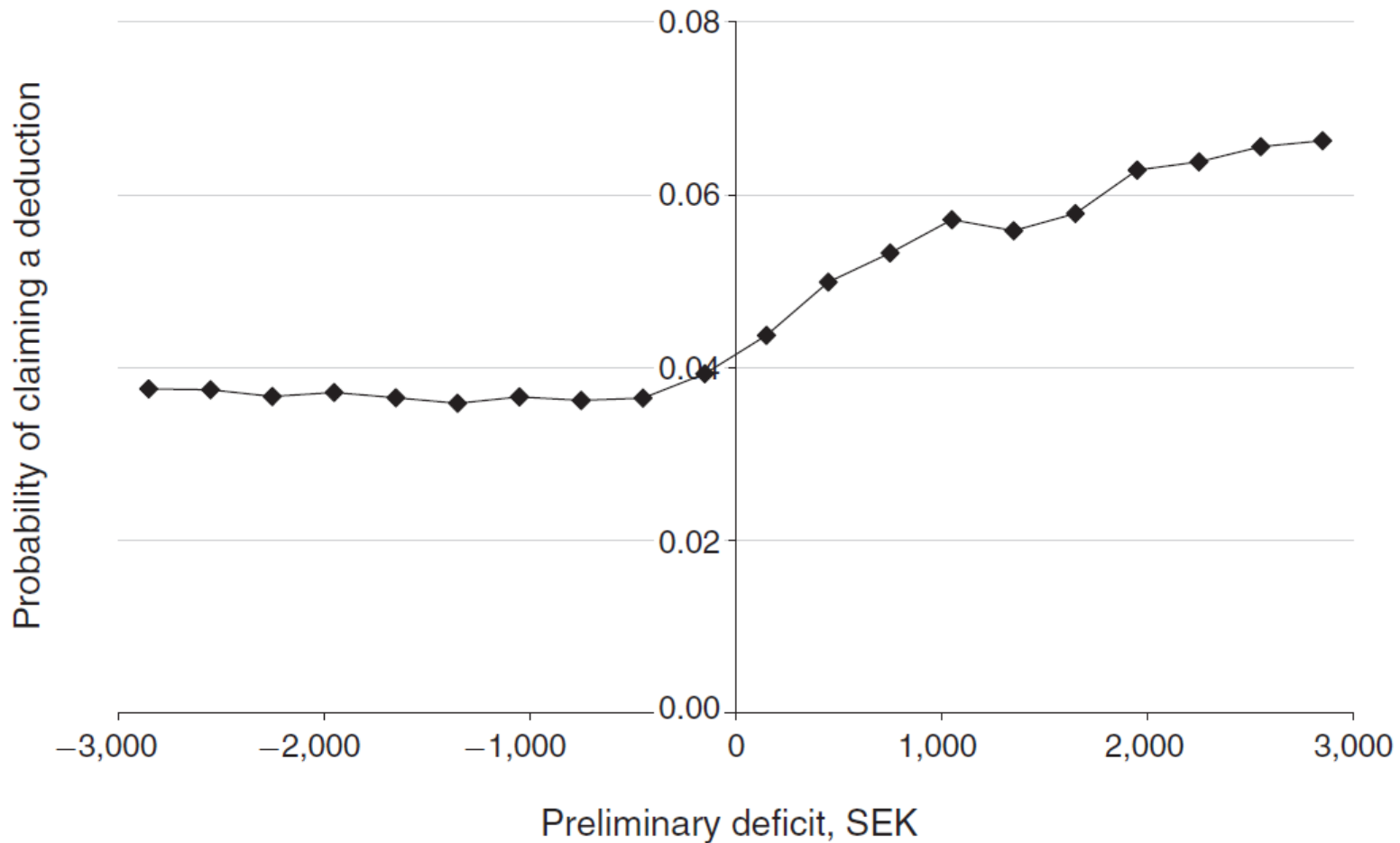


FIGURE 4. THE VALUE OF CLAIMING A DEDUCTION IN THREE CASES DEPENDING ON THE PRELIMINARY DEFICIT

Source: Engström et al. (2015)





Findings:

1. Robust evidence of kink at zero.
2. IV strategy suggests probability of claiming higher given a loss versus a gain.

Source: Engström et al. (2015)

Summary

Very clear demonstration of loss aversion affecting the claiming of a deduction.

Testing long-standing hypothesis in the literature. (see, e.g., Feenberg and Skinner 1989)

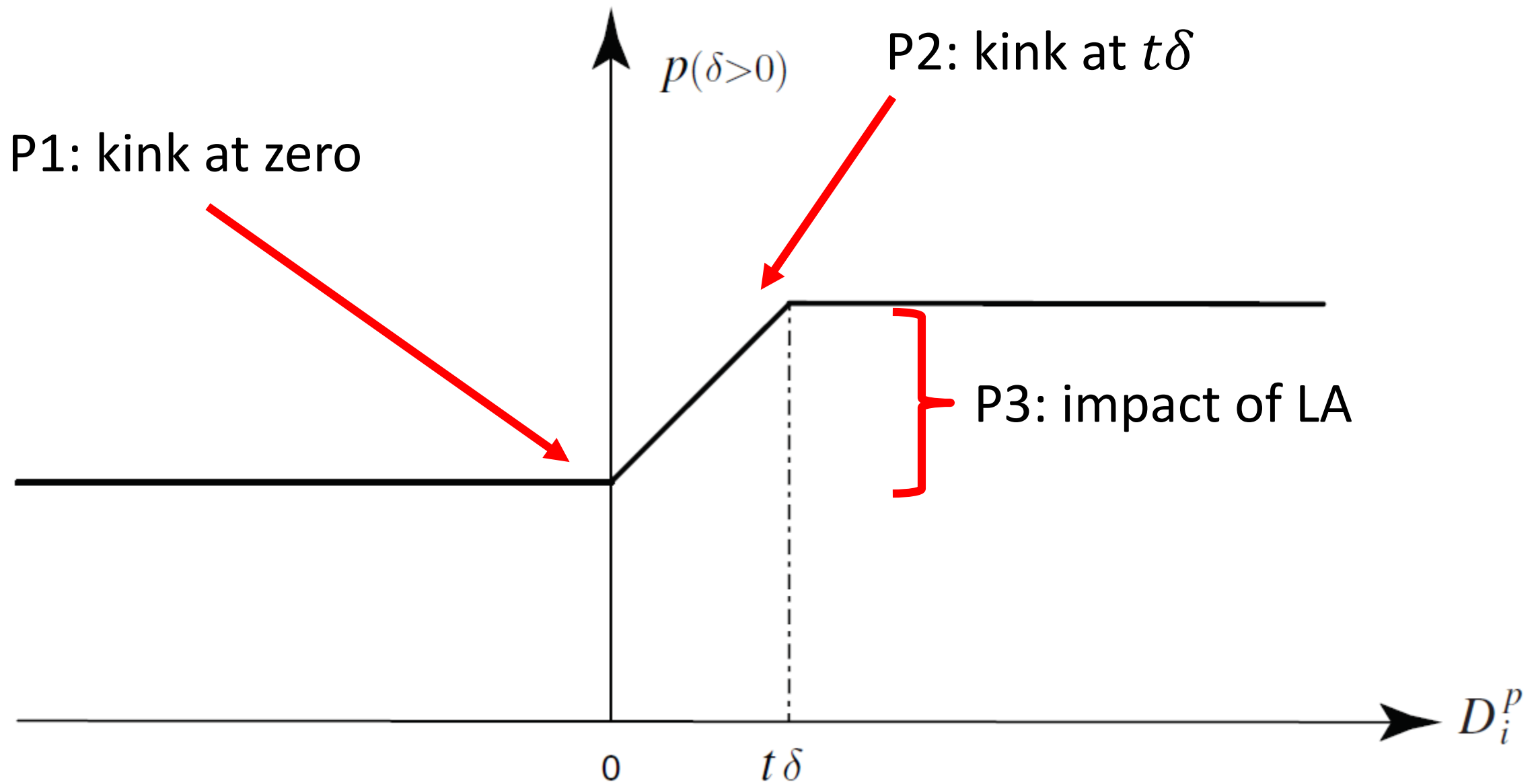
Natural question: how costly is this behavior? How much is avoidance/evasion affected?

- Turns out to be tricky to answer....

Rees-Jones (2018)

Goal of paper: Generate approach to assessing amount of avoidance and evasion attributable to loss-averse behavior.

Why is this hard?



Rees-Jones (2018)

Goal of paper: Generate approach to assessing amount of avoidance and evasion attributable to loss-averse behavior.

Why is this hard?

1. Multiple dimensions of behavior.
2. Some dimensions unobserved.
3. Don't know order of consideration.
4. Preliminary deficit heterogeneous and unknown.
5. Location of second kink heterogeneous and unknown.
6. Costs of avoidance/evasion heterogeneous and unknown.

Basic idea of the paper

We can accommodate all of these problems in a bunching-type approach.

- Cons: Gives up on identifying structural parameters.
- Pros: Stark reduced-form predictions and gives a sufficient statistic for policy impact.

Part 1: work out the details theoretically.

Part 2: examine in US tax returns.

Theoretical approach

Characterize a *tax manipulation opportunity* by two parameters: (m, c) .

Imagine an individual's decision on tax day as facing a large sequence of these opportunities and deciding which to take.

- E.g., how long to sift through one's file drawer.

Basic decision rule: sort by efficiency (m_i/c_i) , then continue until $V(m_i) < c_i$.

- Generates a partition: opportunities that you always take, that you never take, and you *might take*.

Key features

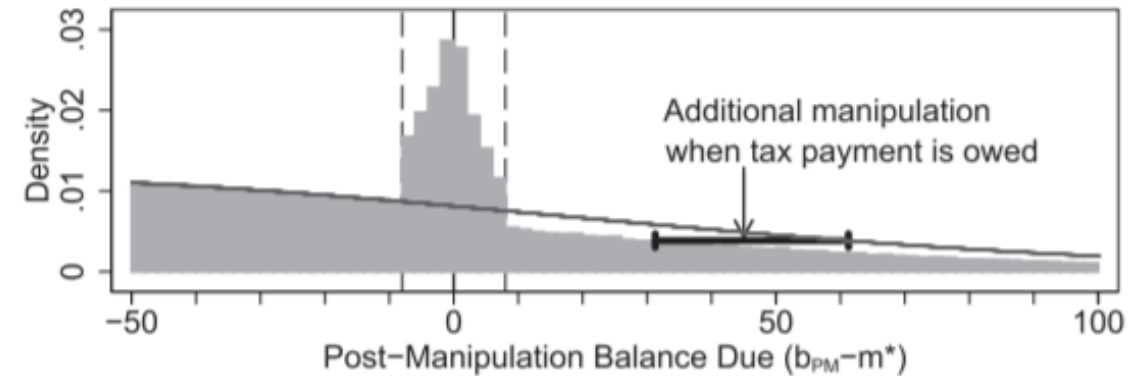
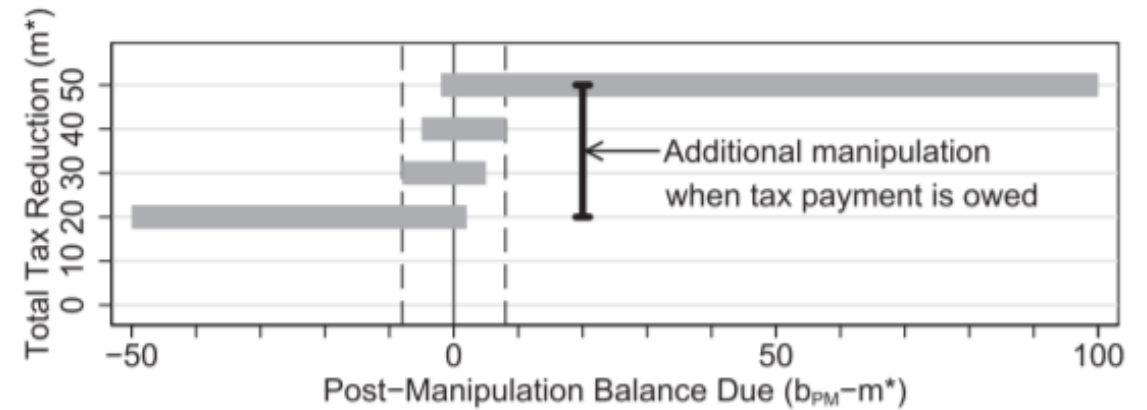
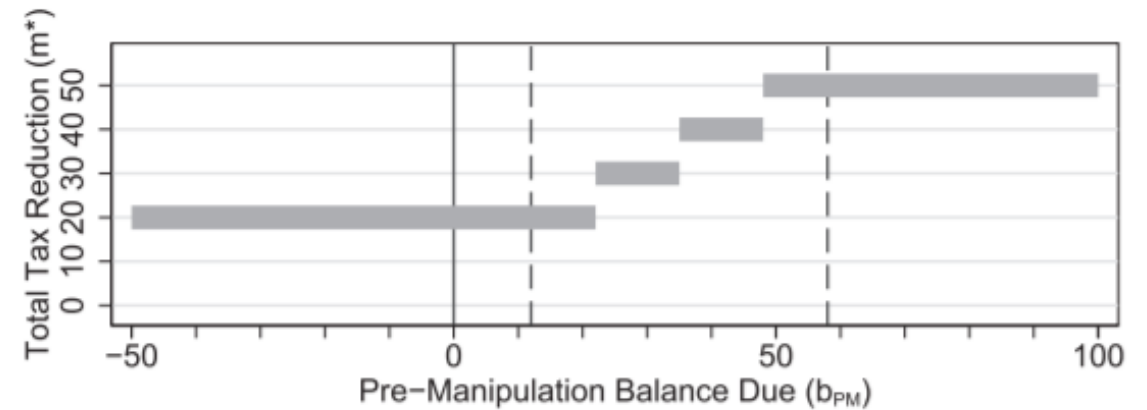
Chain of “little” zs for each taken opportunity.

Forms “big” z when evaluated over preliminary deficit.

Forms compressed z when evaluated over reported deficit.

Basic predictions:

1. Bunching at reference point
2. Shift of loss domain

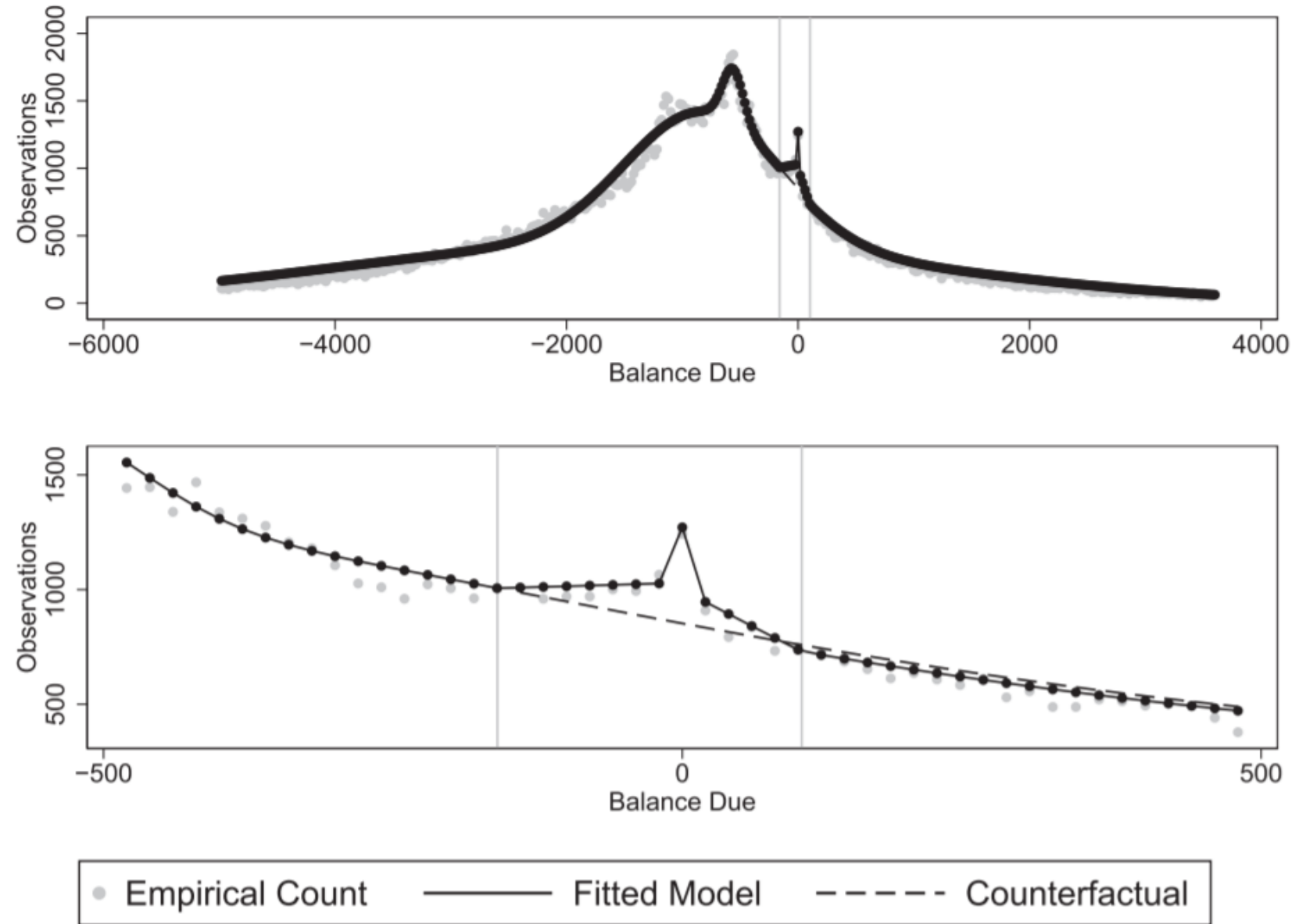


Source: Rees-Jones (2018)

Dataset: IRS SOI Panel of Individual Returns

Contents: Nearly all line items from the U.S. form 1040 and supplemental schedules.

My sample for analysis: approximately 53k tax filers followed for 229k person-year observations between 1979 and 1990.



Source: Rees-Jones (2018)

Estimates of additional manipulation when facing a loss

Panel A: full sample estimate and heterogeneity by income

	Full sample	Income quartiles			
		1	2	3	4
Extra manip. for loss (\tilde{m})	33.8 (2.89)	20.8 (5.59)	20.5 (4.76)	33.4 (10.11)	45.0 (9.18)
N	206,188	57,126	55,986	52,354	40,722

Panel B: restricting sample by presence of tax reductions

	Itemized deductions		Adjustments to income		Credits	
	claimed	not claimed	claimed	not claimed	claimed	not claimed
Extra manip. for loss (\tilde{m})	45.6 (6.96)	26.0 (3.59)	47.3 (7.06)	29.9 (3.71)	19.6 (5.72)	33.9 (3.32)
z -test p -value		0.012		0.029		0.031
N	70,278	135,910	39,611	166,577	65,433	140,755

Notes: This table presents parameter estimates of the extra manipulation pursued when facing a loss (\tilde{m}) based on the estimation strategy described in Section 3. Estimation sample restricted to balance due values between the 5th and 95th percentile. Block-bootstrapped standard errors, resampling by taxpayer ID and based on 5,000 simulations, are presented in parentheses. Plots of the fitted distributions are presented in Figures 3 and 4. All monetary amounts are expressed in 2016 dollars. Assignment to income quartiles is evaluated according to filing-year-specific AGI distributions.

Rees-Jones (2018): summary

More evidence that loss aversion affects tax compliance.

Estimate of its impact: \$34 per person in the loss domain.

To help scale the effect size:

- If all filers came to view their bill as a gain: extra 1.4 billion dollars collected.
- If all filers came to view their bill as a loss: 3.7 billion dollars avoided/evaded.

Comparable in size of policy importance to the lost interest due to overwithholding.

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www.hmrc.gov.uk

Date of issue 4 August 2011

Reference REFERENCE NUMBER

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Our records show that your Self Assessment tax payment is overdue.

Nine out of ten people pay their tax on time.

It is easy to pay. Please call the phone number above to pay by debit card, credit card, or Direct Debit.

You can also pay using internet and telephone banking. For more information on when and how to pay, go to www.hmrc.gov.uk/payinghmrc

If you don't believe that this payment is overdue, please contact us on the number above.

If you have already paid, thank you. If not, please act now.

Yours faithfully

Officer of Revenue and Customs

IDMS99P

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More than just PT

A large amount of attention has been devoted to prospect theory, but many other levers being pulled.

- Social norms.
- Stigma.
- Civic duty.
- Peer effects.

Key applications:

- Hallsworth et al. (2017): UK Nudge Unit's Attempts.
- Perez-Truglia and Troiano (2018): Shaming tax delinquents.

In sum

Tax compliance has clear “behavioral” components.

- Standard rational theories get several of the key pieces right.
- But many details require behavioral concepts to rationalize.

Plenty of room for more applications.

Wrapping up

Behavioral Economics and Tax Policy

In my opinion: behavioral PF is a major part of the frontier of behavioral economics.

There is now a reasonably large and thriving literature showing how to go about this type of exercise. BUT, still a great deal of low-hanging fruit for the graduate students in the audience.

Potential to be important in current tax policy debates.

Key element to explore: behavioral drivers of attitudes towards inequality and taste for redistribution.

- Plenty of work out there, but to my eye we have not yet really integrated into our collective thinking about potential tax policy interventions.

Thanks

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