Quantifying Loss-Averse Tax Manipulation

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Abstract

Alex Rees-Jones (2018) “Quantifying Loss-Averse Tax Manipulation”
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- Presents the effects of *loss-aversion* from the evidence of US taxpayers.
- Taxpayers are engaged to persue tax reduction activity especially when they have some positive due near the date of payment.
- Distribution of reported tax bill has excess mass around the border whether they must pay or not.

Institutional Background

- In the US, one's tax payment in each year is determined by the Internal Revenue Service (IRS), based on the difference between the reported taxable income and the her/his payment in advance: "balance due."
- If the balance due (denoted by b) is positive, the tax filer must that amount to the IRS, and if negative, then s/he can receive a refund.
- Balance due can be "manipulated," by reporting donation they did, or enrollment in charitable contribution.

  $\Rightarrow$ Loss-Averse affects the tax filers' behavior according to their initial balance due, resulting in the bunching of the reported (observed) payment.

contribution

This paper contributes in three ways:

1. Illustrate robust and observable features of the presence of loss-aversion with minimal assumptions.
2. Estimate the impact of loss-aversion measured in dollers.
3. Specify the way to apply similar settings:

   loss-averse individual is able to manipulate an observable outcome.

Procedure of the Manipulation

Every April, taxpayers go through the process below:

1. Report their taxable income, such as wages, salaries, tips, business income, investment income, and so on.
2. Report "adjustments," to claim for things such as donations or payments for alimony

   $\Rightarrow$ Adjusted Gross Income (AGI) is calculated: balance due before manipulation.
3. Accept AGI or complete an additional form of reduction: Itemization

   –Report deductable activities such as charitable contributions, medical and dental expenses, home mortgage interest payments.
4. Final balance due is confirmed:

   Claim credits for pursuing tax incentivised behaviour and report other taces paid, payments already made to IRS .

Sequential Manipulation

- Given b_{PM}: balance due prior to manipulation, taxpayers face a sequense of manipulation opportunities, each of which is charactarized by the parameters : $\{m_i, c_i\}_{i=1}^{J}$

  m_i denotes the tax reduction by the ith manipulation

  c_i is the intrinsic cost

Cost by manipulation

Taxpayers consider their benefits and costs to decide whether to make efforts to tax manipulation.

- Blumenthel and Slemrod (1992)

  It spend on average 27 hours documenting and reporting for tax reduction

- Benzarti (2015)

  They dislike tasks for tax 4.2 times as that for working with same time length

- Ordinary gain-loss function:

$$\Phi(x|r) = \begin{cases} x - r & \text{if } x \geq r \\ \lambda(x - r) & \text{if } x < r \end{cases}$$

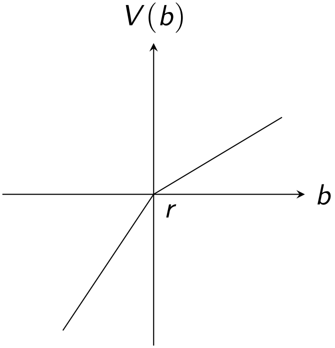
- Applying this structure, loss-averse taxpayers' evaluattion of the benefit from each manipulation:

$$\begin{aligned} V(m_i|b, r) &= \Phi(-b + m_i|r) - \Phi(-b|r) \\ &= \begin{cases} m_i & \text{if } -b \geq r \\ \lambda(r + b) + (m_i - b - r) & \text{if } -b \in [r - m_i, r] \\ \lambda m_i & \text{if } -b \leq r - m_i \end{cases} \end{aligned}$$

- Taxpayers continue to manipulate iff $m_i < c_i$.

Gain-Loss Function

- If there remains tax due after reduction, then all the value of the manipulation is evaluated as loss.
- When, on the other hand, manipulation cancels out the due before, the margin to be refunded is evaluated as gain.
- If s/he does not have to pay more, then the reduction by the manipulation is fully counted as gain.



gain-loss function

Assumption

Assume tax filers consder the most efficient manipulation.

- For $i < j$, $m_i / c_i \geq m_j / c_j$.

  : They considers each oppoturnity of manipulation, in the most efficient order.

- $m_1 / c_1 > 1$.

  : There exists at least one desirable manipulaton oppoturnity.

- As $n \to \infty$, $m_n / c_n \to 0$.

  : The number of desirable opportunity is finite.

Taxpayers continue manipulating as long as $V(m_i | b, r) \geq c_i$, and stop when $V(m_i | b, r) < c_i$.

Thresholds

They define two thresholds of $i \in J$ that stop the manipulation depending on the gain-loss situation.

$$L = \max\left\{ i : \frac{m_i}{c_i} > 1 \right\}$$
$$H = \max\left\{ i : \frac{m_i}{c_i} > \frac{1}{\lambda} \right\}$$

- L is the threshold for gain phase, while H is the one for loss phase.
- $L \leq H$, where equality holds if there is no i s.t. $m_i/c_i \in (1/\lambda, 1]$.

Example

TABLE 1
An example sequential manipulation problem

(1)	(2)	(3)	(4)	(5)	(6)	(7)
i	m_i	c_i	Takes opportunity if	Terminal opportunity if	Manipulated balance due range	Alt. cost sequence
1	10	5	Always	Never	—	5
2	10	8	Always	$b_{PM} \leq 22$	$(-\infty, 2]$	8
3	10	12	$b_{PM} > 22$	$b_{PM} \in (22, 35]$	$(-8, 5]$	16
4	10	15	$b_{PM} > 35$	$b_{PM} \in (35, 48]$	$(-5, 8]$	25
5	10	18	$b_{PM} > 48$	$b_{PM} > 48$	$(-2, \infty)$	34
6	10	22	Never	Never	—	44

$$\lambda = 2$$

When balance initial balance due $b_{PM} \leq 22$, s/he continues to manipulate until $i = 2$, while one with $b_{PM} > 48$ goes till $i = 5$: $L = 2, H = 5$.

- Expected range of the balance due after manipulation is $(-8, 8)$, which generates excess mass or bunching.

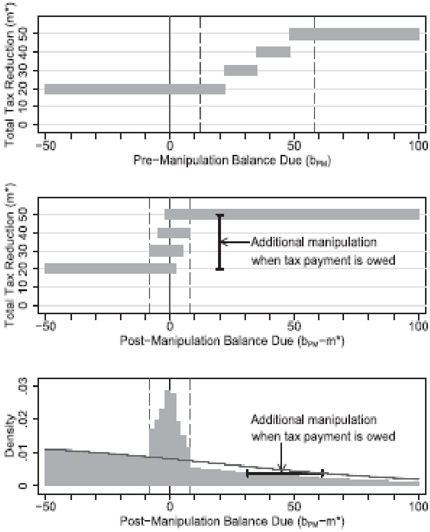


Figure 1
Predictions of loss-averse tax manipulation.

Total Amount of Manipulation

Total manipulation is expressed as a function of the taxpayer's pre-manipulation balance due b_{PM}:

$$m^*(b_{PM}|r) = \begin{cases} \sum_{i=1}^{L} m_i & \text{if } b_{PM} \leq T_1 \\ \sum_{i=1}^{L+1} m_i & \text{if } b_{PM} \in (T_1, T_2] \\ \dots & \\ \sum_{i=1}^{L+J-1} m_i & \text{if } b_{PM} \in (T_{J-1}, T_J] \\ \sum_{i=1}^{H} m_i & \text{if } b_{PM} > T_J \end{cases}$$

where T_j denotes

$$T_j = \max\left\{ b_{PM} : V\left(m_{L+j} | b_{PM} + \sum_{i=1}^{L+j-1} m_j, r \right) \leq c_{L+j} \right\}$$

Distribution after Manipulation

- $f^{\mathrm{PM}}(b)$ denotes the ditribution of the pre-manipulation balance due, while $f(b)$ is that of post-manipulation.
- All the taxpayers make manipulation of $i = 1$ to L, so the distribution at least shift to the left uniformly, denoted with $g(b)$.
- Furthermore, those with positive balance due after the Lth manipulation continue to reduce tax, until H or when their balance due is in the stop range.

$$f(b) = f^{\mathrm{PM}}(b + m^*) = \begin{cases} g(b) & \text{if } b \leq B_1 \\ g(b) + E_1(b) & \text{if } b \in (r - B_1, r] \\ g(b + \tilde{m}) + E_2(b) & \text{if } b \in (r, r + B_2) \\ g(b + \tilde{m}) & \text{if } b \geq r + B_2 \end{cases}$$

where $\tilde{m} = \sum_{i=L+1}^{H} m_i$, and

$$E_1(b) = g(b + \tilde{m}) \times I\left(b + \sum_{i=1}^{H} m_i > T_J\right) + \sum_{j=1}^{J-1} g\left(b + \sum_{j=1}^{L+j} m_i\right) \times I\left(\left(b + \sum_{i=L+1}^{L+j} m_i\right) \in (T_j, T_{j+1})\right)$$

$$E_2(b) = g(b) \times I\left(b + \sum_{i=1}^{L} m_i \leq T_1\right) + \sum_{j=1}^{J-1} g\left(b + \sum_{j=1}^{L+j} m_i\right) \times I\left(\left(b + \sum_{i=L+1}^{L+j} m_i\right) \in (T_j, T_{j+1})\right)$$

E_1, E_2 generates the excess mass.

Data

- Satatistics of Income Panel of Individual Returns
  - Random sample of tax filers, according to the Social Security Numbers
  - contain many line items reported on the tax return allowing the direct observation of balance due and many steps of its calculation
  - Data years:1979-1990
  - 229,116 tax returns filed by 53,177 taxpayers: exculudeing those with zero-tax liability, in order to eliminate the excess mass owing to non-preference-based discontinuities.