Nudging Businesses to Pay Their Taxes: Does the Timing of Reminder Letters Matter?

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Background

- Tax non-compliance takes the form of both unreported income and unpaid debts to the tax office
- There is comparatively little research on the timely payment of tax debts (Hallsworth, 2014)
- Tax gap estimates for the US show average underpayment of $39bn in 2008-2010
- The bulk of unpaid debt is owed by individual taxpayers and unincorporated businesses
- In Australia, 30 per cent of small businesses did not pay their tax liabilities on time during the financial year 2016-17 and together owed around 67 per cent of total collectible tax debt

Aim of the trial

- While some taxpayers are unwilling to pay, many have simply forgotten about their debt
- We study the effect of the timing of reminder letters on the payment behaviour of small businesses
  - Target population: businesses with a history of compliant payment behavior
  - Cases were randomly allocated to receive a reminder letter about one, two or three weeks after their missed tax debt due date
  - A control group did not receive a letter for the seven week duration of the trial

Model

- Taxpayers trade-off the benefit of paying their tax immediately or waiting until the opportunity cost of payment is lower
- Disadvantages of delay include interest penalties on the outstanding debt and the possibility that the debt is forgotten
- If the debt is forgotten, it remains out of memory until a reminder is received from the tax authority
- Sending reminder letters early alerts taxpayers who have forgotten about their debts
- However, an early reminder letter may also cause taxpayers to believe they will receive frequent reminders, reducing the cost of delay and lowering the likelihood of payment

The taxpayer's problem

- Paying tax incurs a cost of action, c_t, plus the cost of the outstanding tax debt, d
- c_t is assumed to be independently drawn each period from a continuous distribution F with density f
- If the taxpayer does not pay today, an interest charge is added and the debt grows to gd dollars next period, where $g > 1$
- Taxpayer remember their outstanding debt with probability ρ each period and forget about the debt with probability $(1 - \rho)$
- Taxpayers believe that they will receive a reminder letter each period with probability $\widehat{\delta}$, which may differ from the actual probability δ

The taxpayer's problem

- The perceived value function for a taxpayer who has an unpaid tax debt d in memory is given by

$$V(d, c, \widehat{\delta}) = \max \left\{ -(d + c), \frac{\rho}{R} \mathbb{E}[V(gd, c, \widehat{\delta})] \right.$$

$$\left. + \frac{(1 - \rho)}{R} \mathbb{E}[W(gd, c, \widehat{\delta})] \right\},$$

where $R > 1$ is the taxpayer's discount rate and

$$W(d, c, \widehat{\delta}) = \widehat{\delta} V(d, c, \widehat{\delta}) + (1 - \widehat{\delta}) \mathbb{E}[W(gd, c, \widehat{\delta})]$$

is the perceived value function for a forgotten tax debt

The taxpayer's problem

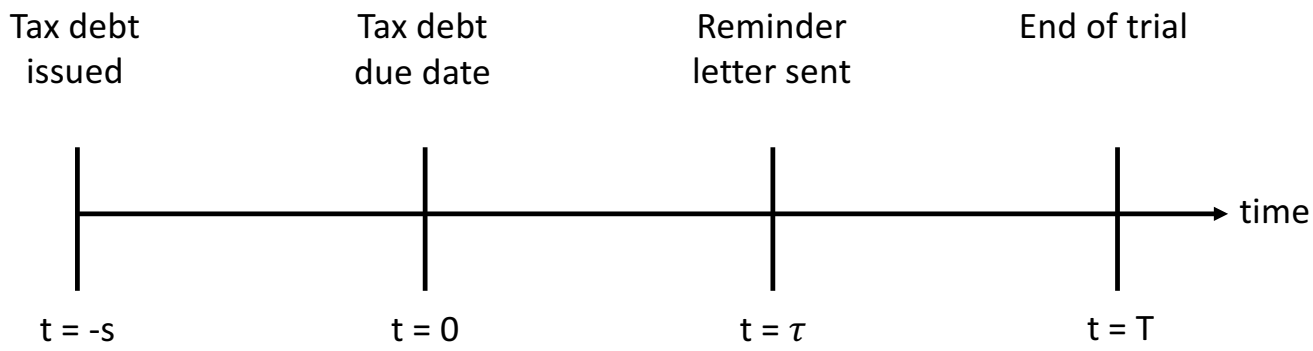
- If the debt is in memory, the taxpayer will pay in period t if $c_t < \overline{c}$, where $\overline{c}$ equates the value of paying today with the value of waiting:

$$\overline{c} = -d - \frac{\rho}{R}\mathbb{E}[V(gd, c, \widehat{\delta})] - \frac{(1-\rho)}{R}\mathbb{E}[W(gd, c, \widehat{\delta})]$$

- If the debt is in memory, the debt is paid with probability $F(\overline{c})$

$\rightarrow$ An increase in the perceived probability of receiving a reminder letter $\widehat{\delta}$ lowers the threshold $\overline{c}$ and reduces the probability of debt payment if it is in memory

Experimental setup



The effect of a reminder letter on payment behavior

- A tax debt is defined to be *active* if it is unpaid and in memory
- We say a reminder letter is *useful* if a debt is unpaid and forgotten
- Probability that a tax debt is paid in period t:

$$p_t = F(\overline{c}_t) Pr(active_t)$$

- A reminder letter sent at time τ activates forgotten debts, which occurs with probability $Pr(useful_t)$

The effect of a reminder letter on payment behavior

- Sending a reminder letter at time τ increases the probability of payment by time T by

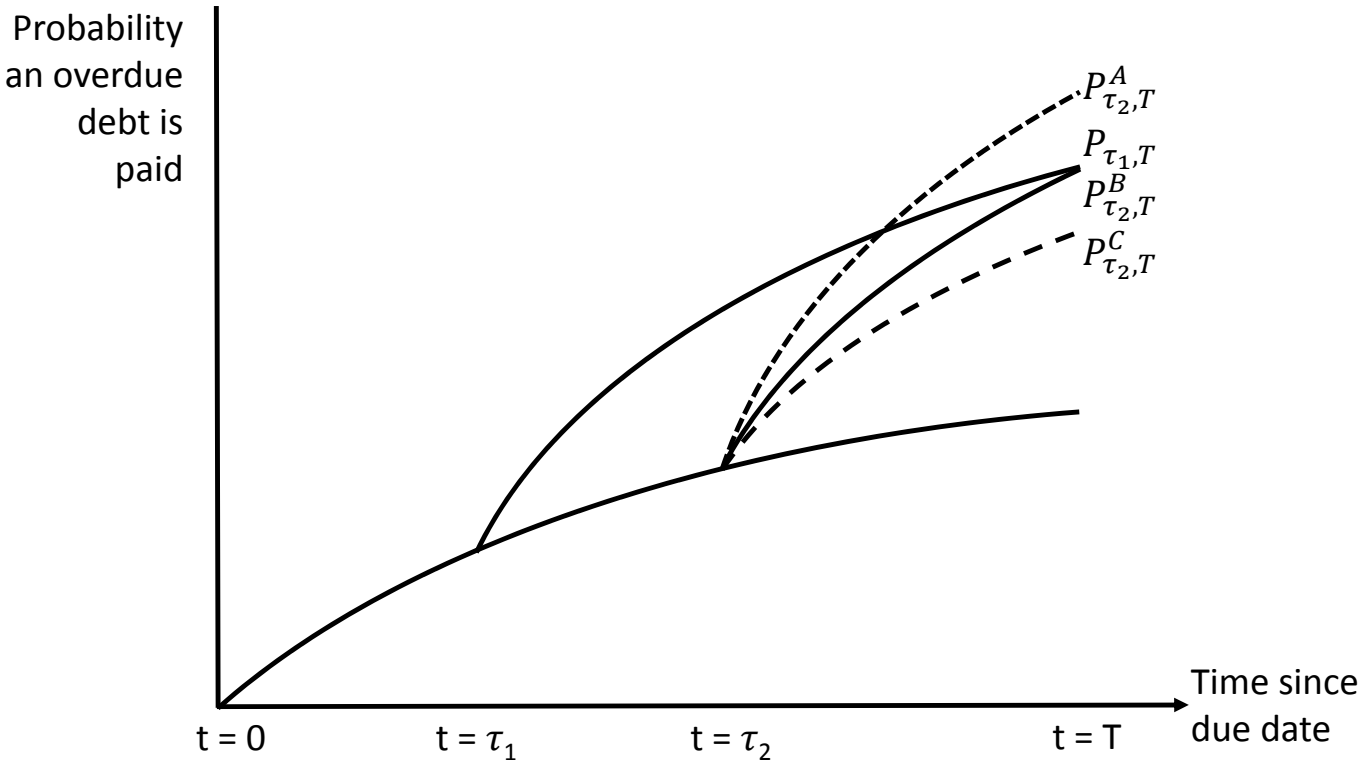
$$Pr(useful_t) \sum_{j=\tau}^{T} p_j | Pr(active_j) = 1$$

- Sending a reminder letter at time $\tau + 1$ increases the probability of payment by time T by

$$\underbrace{[Pr(useful_\tau) + (1-\rho)(1-F(\overline{c}_\tau))Pr(active_\tau)]}_{Pr(useful_{\tau+1})}$$

$$\times \sum_{j=\tau+1}^{T} p_j | Pr(active_j) = 1$$

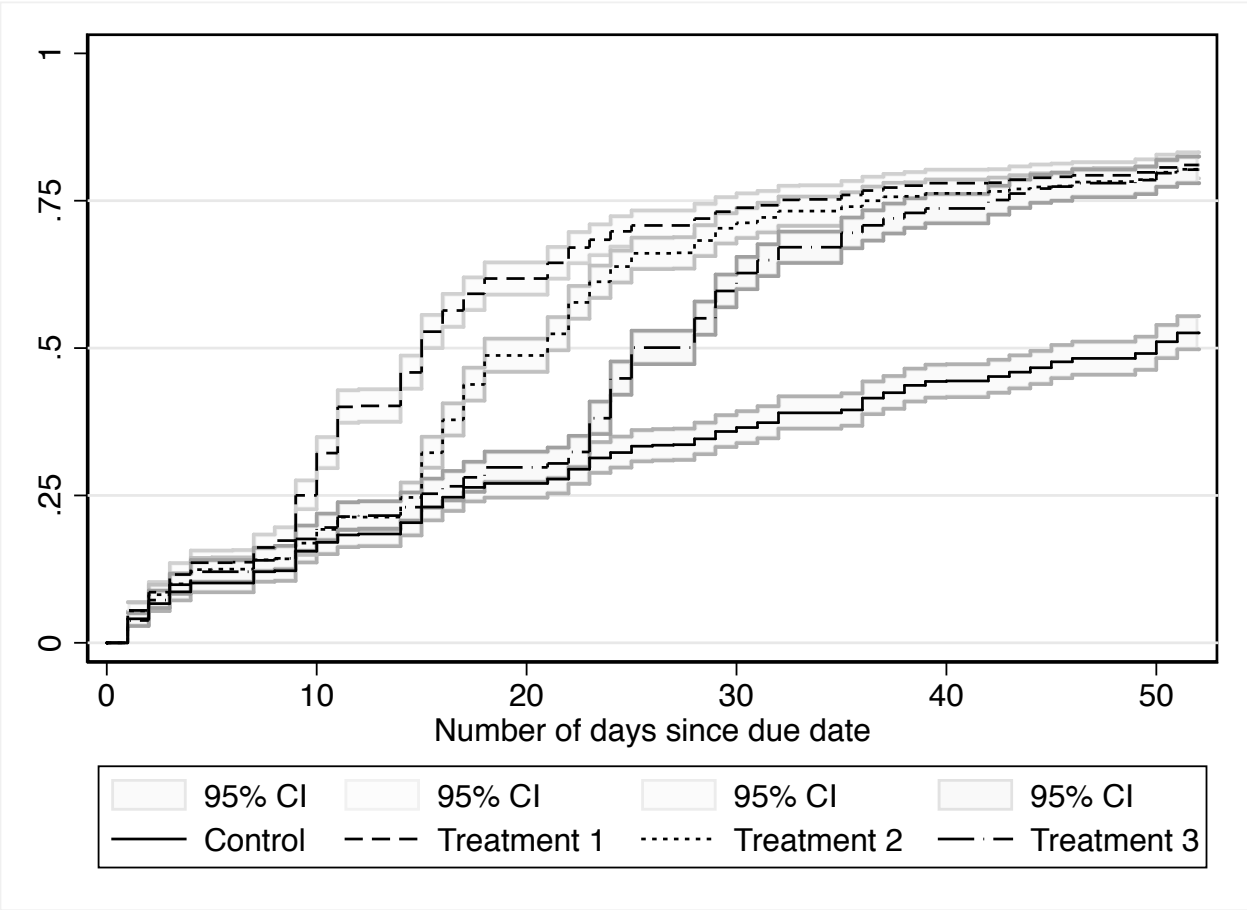
Hypothetical Repayment Rates



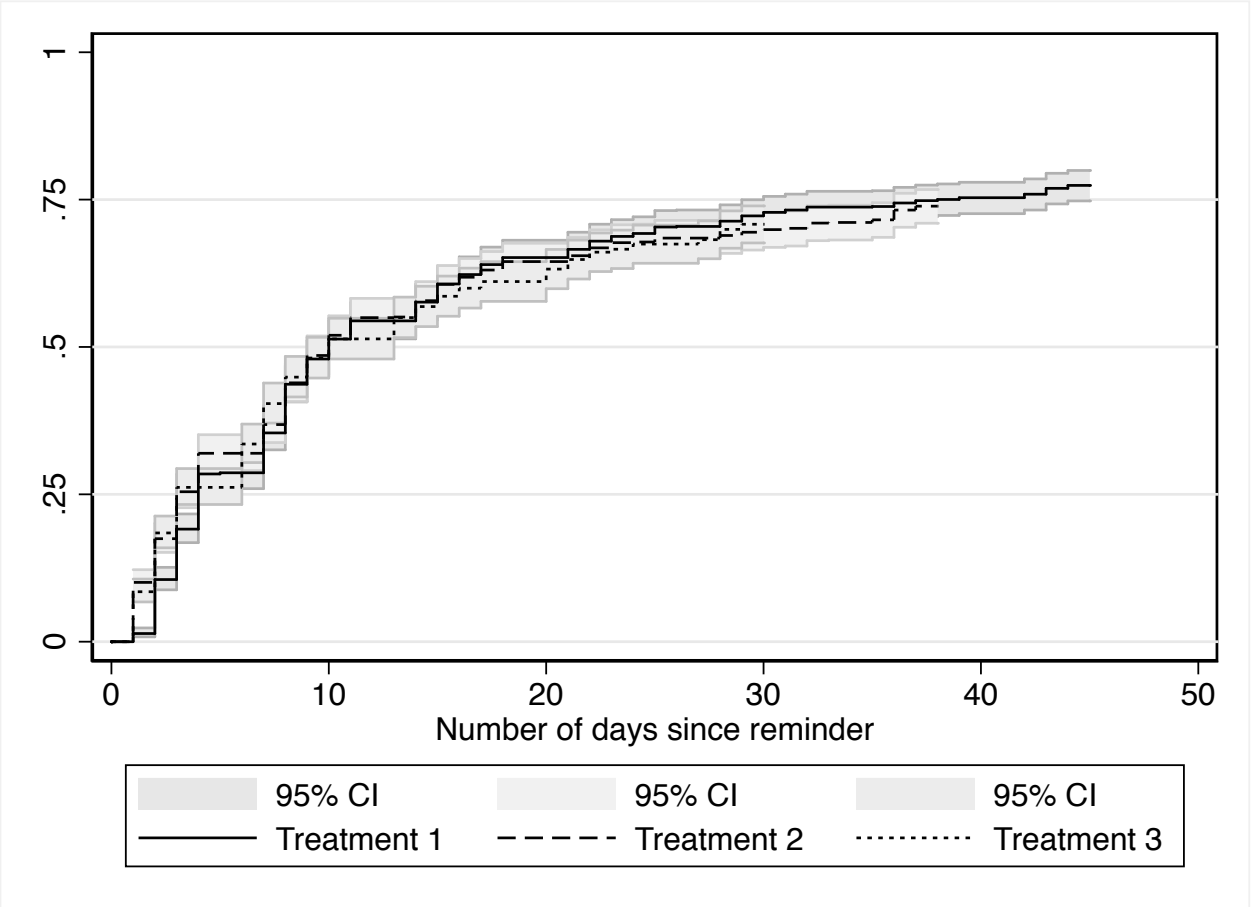
Trial design

- The trial was conducted based on the 26 March 2017 due date
- A total of 4,787 unpaid debt cases were quarantined from the usual ATO treatment pathways
- Cases were randomly allocated to receive a reminder letter either 12, 19 or 27 days following the due date (stratified randomization)
- A control group did not receive a letter for the duration of the trial
- About the same number of observations were allocated to each of the four groups

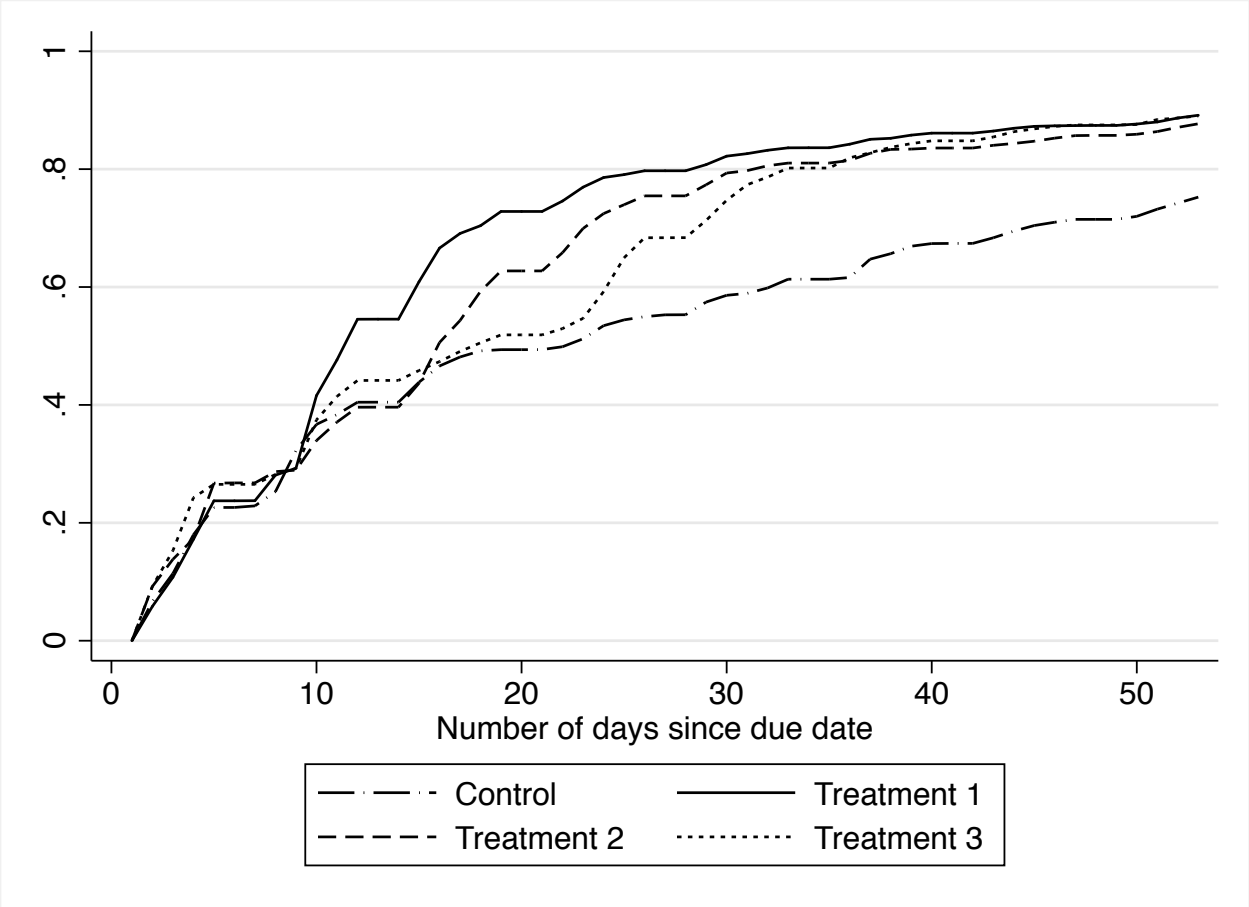
Actual Repayment Rates (Kaplan-Meier Failure Estimates)



Comparison of Payment Profiles



Share of Debt Paid



Treatment Effects on Payment Made by End of Trial

	Treatment 1	Treatment 2	Treatment 3
Panel A: Unconditional linear probability model			
Payment Made by End of Trial	0.248**	0.238**	0.234**
	(0.017)	(0.017)	(0.017)
	[2,401]	[2,402]	[2,388]
By Initial Debt Level			
$0 - $7,499	0.289**	0.279**	0.282**
	(0.019)	(0.019)	(0.019)
	[2,034]	[2,033]	[2,025]
$7,500+	0.025	0.015	-0.028
	(0.029)	(0.030)	(0.033)
	[367]	[369]	[363]

Note: Robust standard errors in parentheses. Number of observations in brackets.
* $p < 0.05$, ** $p < 0.01$.

Treatment Effects on Payment Made by End of Trial

	Treatment 1	Treatment 2	Treatment 3
Panel B: Conditional linear probability model			
Payment Made by End of Trial	0.248**	0.235**	0.229**
	(0.017)	(0.017)	(0.017)
	[2,305]	[2,323]	[2,303]
By Initial Debt Level			
$0 - $7,499	0.290**	0.278**	0.278**
	(0.019)	(0.019)	(0.019)
	[1,947]	[1,959]	[1,949]
$7,500+	0.009	0.000	-0.028
	(0.030)	(0.030)	(0.033)
	[358]	[364]	[354]

Note: Robust standard errors in parentheses. Number of observations in brackets.
* $p < 0.05$, ** $p < 0.01$.

Treatment Effects on Payment Made by End of Trial

	Treatment 1	Treatment 2	Treatment 3
Panel C: Conditional Probit model (marginal effects)			
Payment Made by End of Trial	0.250**	0.235**	0.232**
	(0.017)	(0.017)	(0.017)
	[2,305]	[2,323]	[2,303]
By Initial Debt Level			
$0 - $7,499	0.296**	0.283**	0.284**
	(0.019)	(0.019)	(0.019)
	[1,947]	[1,959]	[1,949]
$7,500+	0.021	-0.002	-0.035
	(0.028)	(0.019)	(0.027)
	[260]	[325]	[298]

Note: Robust standard errors in parentheses. Number of observations in brackets.
* $p < 0.05$, ** $p < 0.01$.

Treatment Effects on Amount Paid by End of Trial

	Treatment 1	Treatment 2	Treatment 3
Panel A: Unconditional linear regression model			
Amount Paid by End of Trial	590.94	252.64	634.77
	(762.23)	(530.19)	(587.46)
	[2,401]	[2,402]	[2,388]
By Initial Debt Level			
$0 - $7,499	463.81**	389.48**	440.74**
	(70.44)	(79.93)	(81.02)
	[2,401]	[2,402]	[2,388]
$7,500+	120.71	-185.18	157.06
	(768.00)	(537.66)	(594.92)
	[2,401]	[2,402]	[2,388]

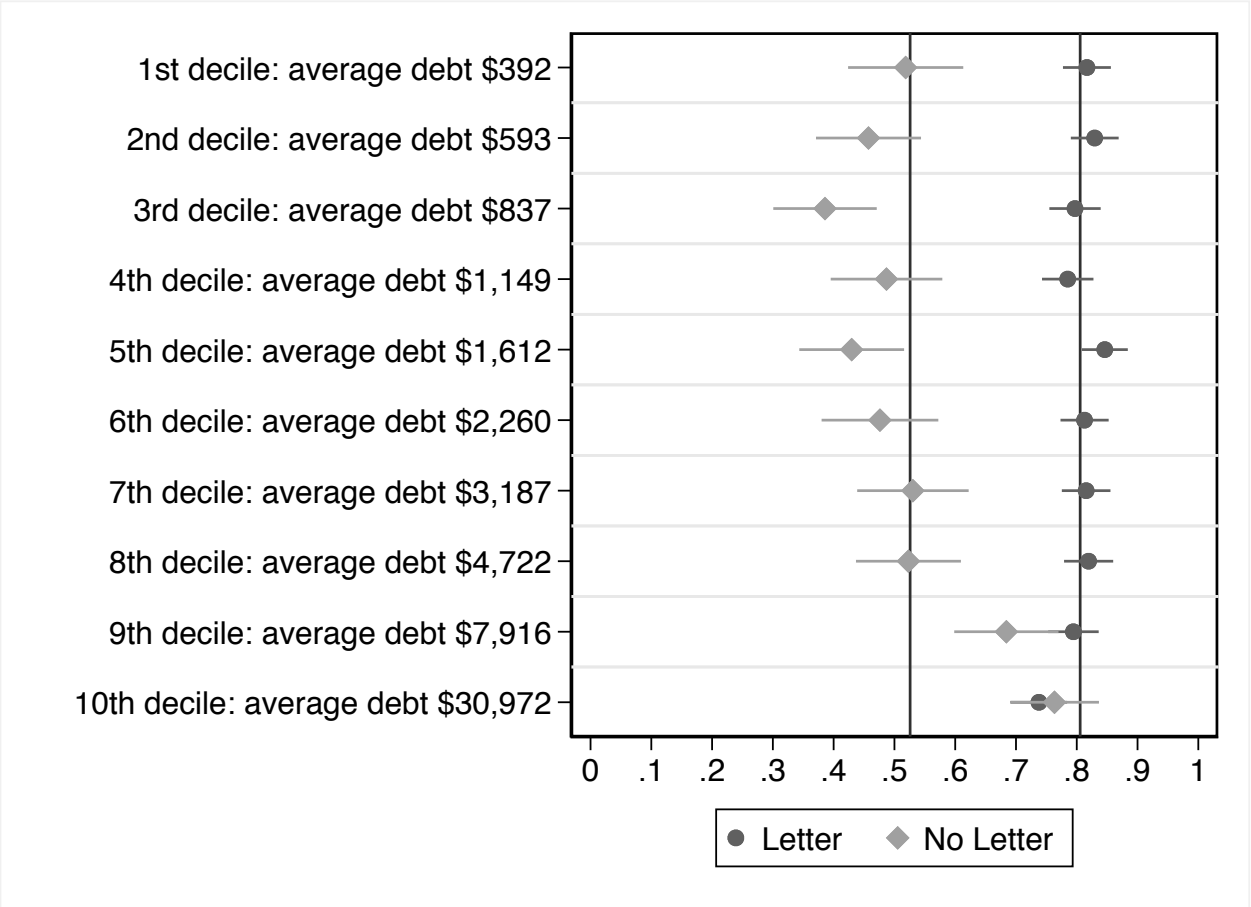
Note: Robust standard errors in parentheses. Number of observations in brackets.
* $p < 0.05$, ** $p < 0.01$.

Treatment Effects on Amount Paid by End of Trial

	Treatment 1	Treatment 2	Treatment 3
Panel B: Conditional linear regression model			
Amount Paid by End of Trial	797.05	135.41	614.75
	(802.71)	(449.77)	(515.95)
	[2,305]	[2,323]	[2,303]
By Initial Debt Level			
$0 - $7,499	470.50**	392.78**	458.77**
	(52.67)	(66.56)	(65.16)
	[2,305]	[2,323]	[2,303]
$7,500+	320.98	-305.79	120.14
	(800.99)	(446.61)	(513.36)
	[2,305]	[2,323]	[2,303]

Note: Robust standard errors in parentheses. Number of observations in brackets.
* $p < 0.05$, ** $p < 0.01$.

Treatment Effect by Initial Debt Level



Cost Calculations

Trial group	Total interest penalties by day 52	Number of letters sent	Cost of letters (at $1.25 per letter)	Interest penalties less cost of letters	Share cases paid by day 52
No letter	$23,742	0	$0	$23,742	0.53
Week 1	$14,532	1,054	$1,318	$13,214	0.81
Week 2	$16,561	926	$1,158	$15,403	0.80
Week 3	$18,414	768	$960	$17,454	0.80

Conclusions

- There is little rigorous evidence on the effect of the timing of reminder letters on tax payment behavior
- We find that reminder letters increase the payment probability by 25 percentage points relative to the control group by the end of the seven week trial period
- Payment probabilities do not differ between treatment groups
- Sending reminder letters early accelerates tax debt collection
- The additional revenue collected relative to debt outstanding is modest
- The only meaningful heterogeneity in payment behavior is related to the level of debt