Nudging Businesses to Pay Their Taxes: Does Timing Matter?

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Introduction

- Timing is an important aspect of policy design that is often overlooked by policymakers (BIT 2014)

- Imperfect memory means that prompting people at different times can have different effects (Ericson 2017)

- Early reminders may be forgotten, or may cause people to overestimate the frequency of reminders, but late reminders reduce the time available to act

- Little empirical evidence on the effect of reminder timing on policy outcomes

- We study the implications of the timing of reminder letters for tax debt payment

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

Tax debt issued — $t = -s$

Tax debt due date — $t = 0$

Reminder letter sent — $t = \tau$

End of trial — $t = T$
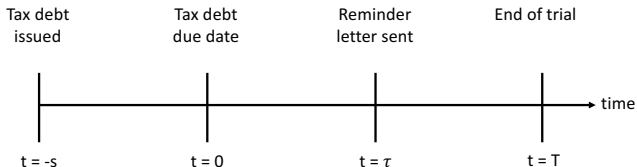
The effect of a reminder letter on payment behavior

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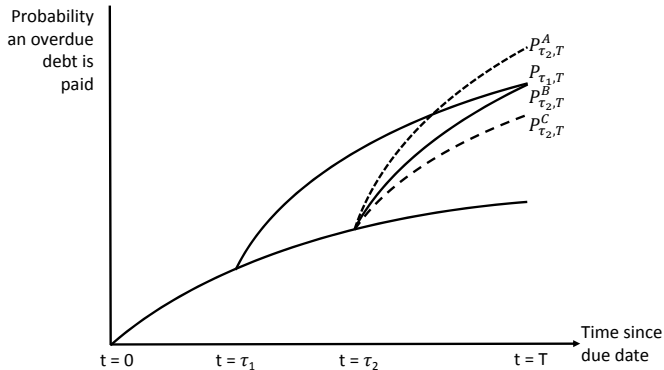
$$Pr(useful_t) \sum_{j=\tau}^{T} p_j | Pr(active_\tau) = 1$$

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

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

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

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

\<TITLE\> \<FIRST NAME\> \<MIDDLE NAME\> \<SURNAME\>
\<ORGANISATION\>
\<ADDRESS LINE 1\>
\<ADDRESS LINE 2\>
\<LOCALITY \<STATE\> \<POSTCODE\>
\<COUNTRY\>

Australian Government
Australian Taxation Office

Our reference:	\<Corres ID\>
Phone:	\< \>
\<TFN\>\<ABN\>:	\<TFN\>\<ABN\>

\<Issue date\>

You have a tax debt

Total due now
\<$Total amount\>

> Have you missed a tax bill?
> You can choose from various payment methods

Dear \<FIRST NAME\>\<Sir/Madam\>,

We haven't received payment for your \<tax type\> bill yet. We can see you normally lodge and pay on time, so in case you can't find the details, here they are again.

Tax type	Amount owing
\<Account type\>	\<$Total amount\>

If you have paid in the last 7 days, thank you. No further action is required.

What you need to do
You need to pay your overdue debt by [14 days from issue date]\<due date\>. Each day your debt remains unpaid it increases. We currently charge interest at \<GIC rate\> a year, compounding daily, until the debt is paid in full.

If you can't pay
If you can't pay the total amount now contact us on \< \> between \<8.00am\> and \<6.00pm\>, \<Monday to Friday\> to see how we can help you.

Most people pay their tax on time and, in doing so, help pay for the essential services we all need and use. Thank you for your payment.

Yours \<sincerely\>\<faithfully\>
\<Deputy Commissioner's Name\>
Deputy Commissioner of Taxation

PAY NOW

Your payment reference number (PRN) is: \<PRN\>

BPAY®

Biller code: \< \>

CREDIT CARD
Pay online with your credit card at \< \>
or phone \< \>.
A card payment fee applies.

For other payment options, visit **ato.gov.au/howtopay**

NEED HELP?

Visit us at **ato.gov.au/contactus**
Or
Contact us on \< \>
between \<8.00am\> and \<6.00pm\>, \<Monday to Friday\>.

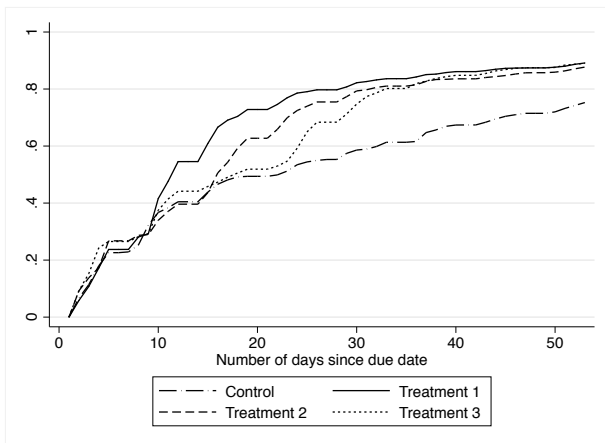**Actual Repayment Rates (Kaplan-Meier Failure Estimates)**
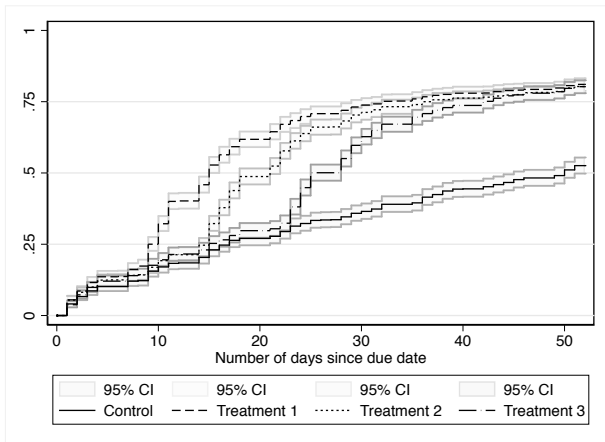
Comparison of Payment Profiles
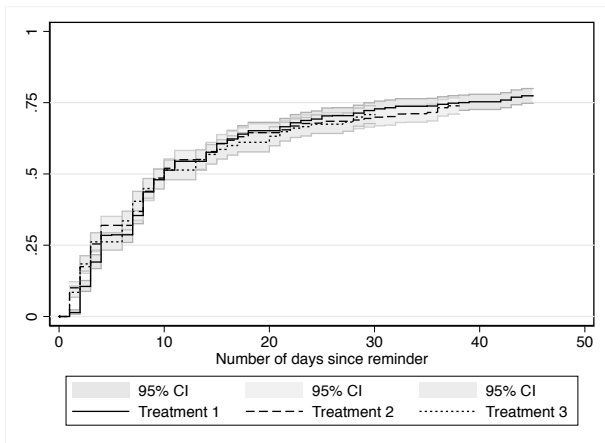
Share of Debt Paid

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.
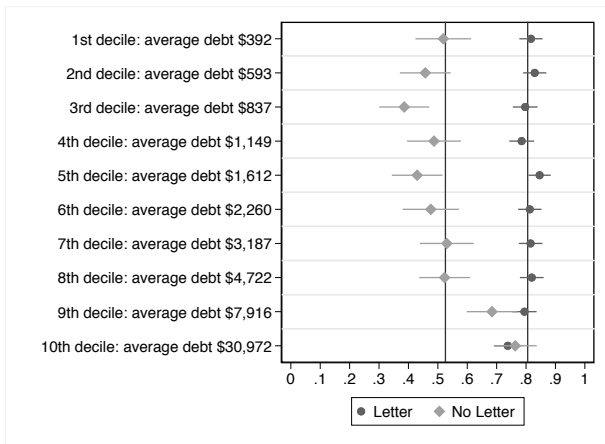* $p < 0.05$, ** $p < 0.01$.

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

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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