

Does the Frequency of Reminders Matter for their Effectiveness? A Natural Field Experiment with Taxpayers in China

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Agenda

- Motivation and Research Questions
- Contribution to the literature
- Experimental Design
- Results
- Conclusions

Motivation and Research Questions

- Tax Compliance one of the biggest challenges faced by governments
 - Gross tax gap in the US for 2011-2013: \$441 billion (IRS, 2019)
 - Gross tax gap in the UK for 2017-2018: £35 billion (HMRC, 2019)

- How to increase tax compliance?
 - Mainstream tools: audits, fines.
 - Nudging: exponential increase of nudge applications (e.g., Mascagni, 2018; Antinyan and Asatryan, 2019)

Motivation and Research Questions

- What is a nudge in an ordinary taxation context?
 - *Low frequency* messages (either a letter or a letter in combination with a reminder) to taxpayers on behalf of tax authorities before a predefined date on which tax compliance is measured.
 - Message: neither forbids any options nor changes the economic incentives of the taxpayers.

Motivation and Research Questions

#	Message	Text of the message	Image
1	Deterrence	Did you know that if you do not pay the CVP on time for a debt of AR\$ 1,000 you will have to disburse AR\$ 268 in arrears at the end of the year and the Municipality can take administrative and legal action?	
2	Fairness	In the first 6 months of this year, CVP's collection contributed to placing 28 new streetlights, water connections in 29 streets and sewerage networks in 21 blocks.	
3	Equity	Did you know that only 30 percent of taxpayers do not pay the CVP? What about you?	
4		Control group	No message/Image

Source: Carlos and Scartascini (2015)

Motivation and Research Questions

- Will high frequency nudges be more effective in nudging individuals to pay their taxes than low frequency nudges?

The Impact of Frequent Reminders

- Limitations in self-control, memory, and attention (Rabin, 1998; DellaVigna, 2009)
- Reminders as an effective device to bring the pending task to people's mind (e.g., Sunstein, 2014) and induce individuals to act.
- Upon receiving a reminder, an individual may postpone the pending task
 - other competing and more attractive activities (Calzolari and Nardotto, 2016),
 - procrastination (Bising and Hyndman, 2020)
 - inappropriate timing of the reminder (e.g., the reminder arrives in the middle of the working day).
- High frequency reminders
 - Continually drive the individual's attention to the pending task and may not allow her to forget about it.
 - Create a payment pressure inducing those individuals who do not want to accomplish the pending task and repeatedly postpone it to act.

The Impact of Frequent Reminders

- Habituation because of frequently implemented treatment stimulus over time (Thomson and Spencer, 1966; Groves and Thompson, 1970; Rankin et al., 2009; Ito et al., 2018).
 - Accustomed to the fact of being regularly communicated
 - Accustomed to the content of the communication, which may mitigate the effect of high frequency reminders on the probability of engaging in a certain conduct.

Contribution to the Literature

- **Contribution 1:** Literature on recurrent nudges (Altman and Traxler, 2014; Karlan et al, 2016; Calzolari and Nardotto, 2016)
 - Current studies: human behavior in recurrent nudge vs. control with no communication
 - Our study: compares treatments with different frequency of nudges
- **Contribution 2:** Literature on nudge applications to tax compliance (see Mascagni, 2018; Slemrod 2019 reviews)
 - No paper has evaluated the impact of communication/nudging frequency on tax compliance (to the best of our knowledge)

Experimental Design

- A randomized controlled trial in the People's Republic of China in collaboration with Baoshan Tax Administration (district in Shanghai)
- 1742 late property taxpayers in Baoshan region in Shanghai
 - The due date of paying taxes was December 31, 2018
 - Did not fulfill the tax obligations as of September 2019 (i.e., there was roughly a nine-month delay)
- Fully digital communication between tax authorities and taxpayers: increasing the frequency of nudging comes at almost no cost
 - 1 message is 0.4 RMB (around 6 cents)

Experimental Design

- Property taxes a relatively new phenomena in China
 - Residents families of Shanghai, pay property taxes for the second and above newly purchased housing units (the tax applies both to second-hand and newly-built housing units);
 - Non-residents of Shanghai, pay property taxes for the first and above newly purchased housing units (again the tax applies both to second-hand and newly-built housing units).
- 60 square meters per family member are tax-exempt.
- Tax rate is set to 0.6 percent and the tax base equals to the 70% of the house price .

Experimental Design

- Our experimental design manipulates the frequency of the communication across four different treatments:
 - (i) *Control*: no communication between tax authorities and taxpayers takes place;
 - (ii) *Low frequency* treatment: only one digital message is sent on behalf of the tax administration in the beginning of the trial.
 - (iii) *Medium frequency* treatment: the same digital message is sent on behalf of the tax administration once every week for four weeks;
 - (iv) *High frequency* treatment: the same digital message is sent on behalf of the tax administration twice every week for four weeks.

Experimental Design

- The reminder dispatched during the trial contained
 - (i) the amount of the property tax due and the overdue fines;
 - (ii) a notice about restricting the house from trading until the tax obligation is fulfilled;
 - (iii) friendly tips for paying the tax and a phone number for questions.

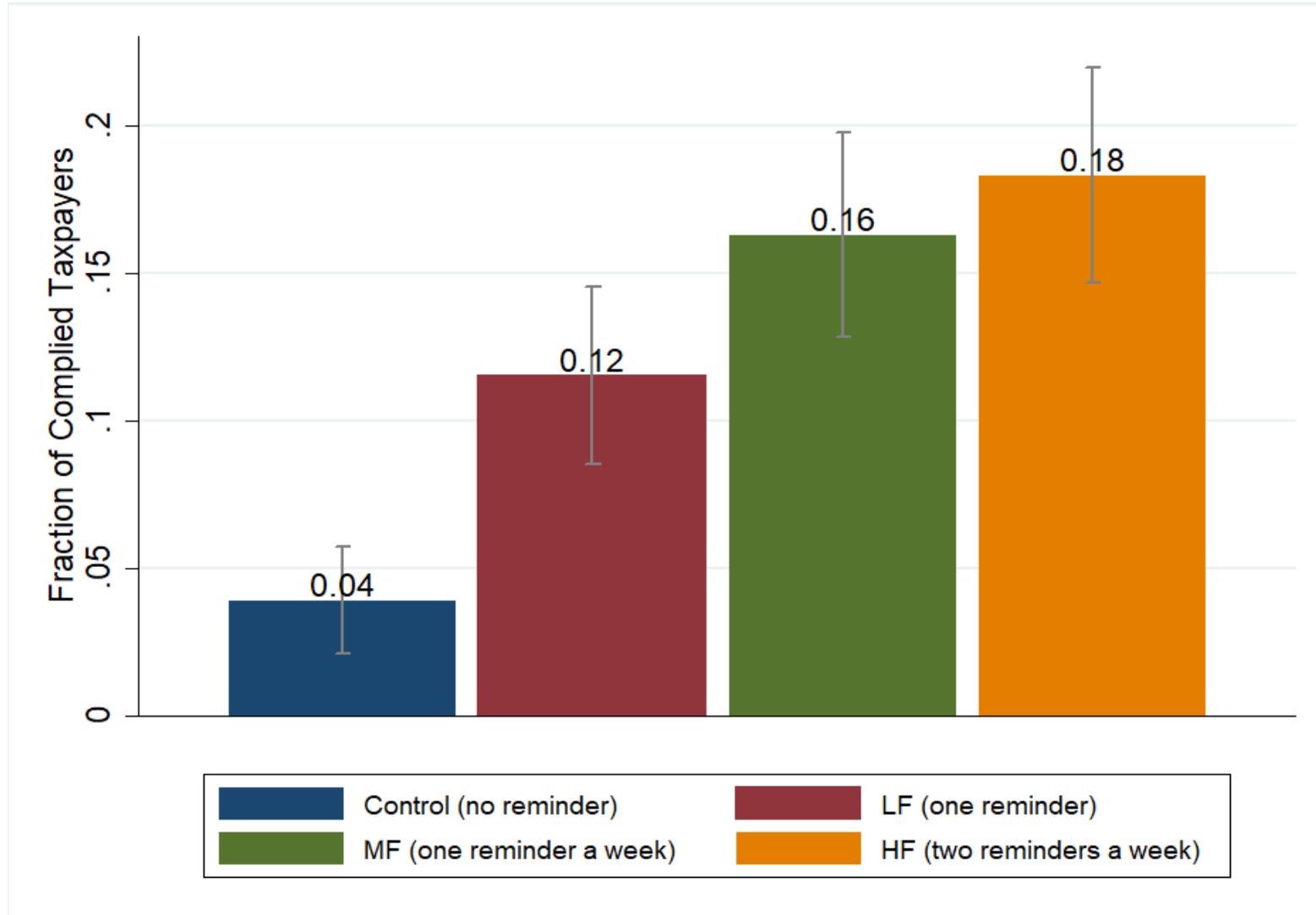
Experimental Design

- Individual level randomization
- The messages disbursed from September 17-October 12, 2019
- Evaluated the impact of the intervention as of November 18, 2019.

Results

- $Y_i = \beta_0 + \sum_{t=1}^3 \beta_t T_{it} + \beta_2 X_i + \varepsilon_i$
- Y_i is the tax compliance measure of individual i ;
 - Binary variable: declared taxed during the trial (=1), did not declare taxes (=0)
- T_{it} is an indicator variable denoting whether individual i belongs to treatment t ;
- X_i is a vector of control variables which includes individual i 's
 - age,
 - gender,
 - the 2018 property tax amount,
 - the number of months the individual paid taxes for the properties she owns by the start of the experiment.
- The coefficient β_t depicts the causal impact of treatment T_t as compared to the control treatment without communication.

Results



Results

LPM	(1)	(2)
LF	0.076*** (0.018)	0.075*** (0.018)
MF	0.124*** (0.020)	0.120*** (0.019)
HF	0.144*** (0.021)	0.148*** (0.021)
Age		0.001 (0.001)
Gender		-0.010 (0.016)
Tax Debt		-0.000* (0.000)
Number of Months Taxes Paid		-0.005*** (0.001)
Constant	0.039*** (0.009)	0.208*** (0.043)
Control Group Mean	3.9%	3.9%
F stat.	24.941	15.715
P>F	0.000	0.000
Adj. R ²	0.026	0.069
N	1,742	1,742

Result 1: Reminders substantially increase tax compliance compared to a setting with no nudging.

- the probability of compliance in *MF* and *HF* is approximately 12–14 percentage points higher (more than 300% increase) as compared to the *Control*.

Result 2: Tax compliance in treatments with recurrent reminders is considerably higher compared to a setting with a single reminder.

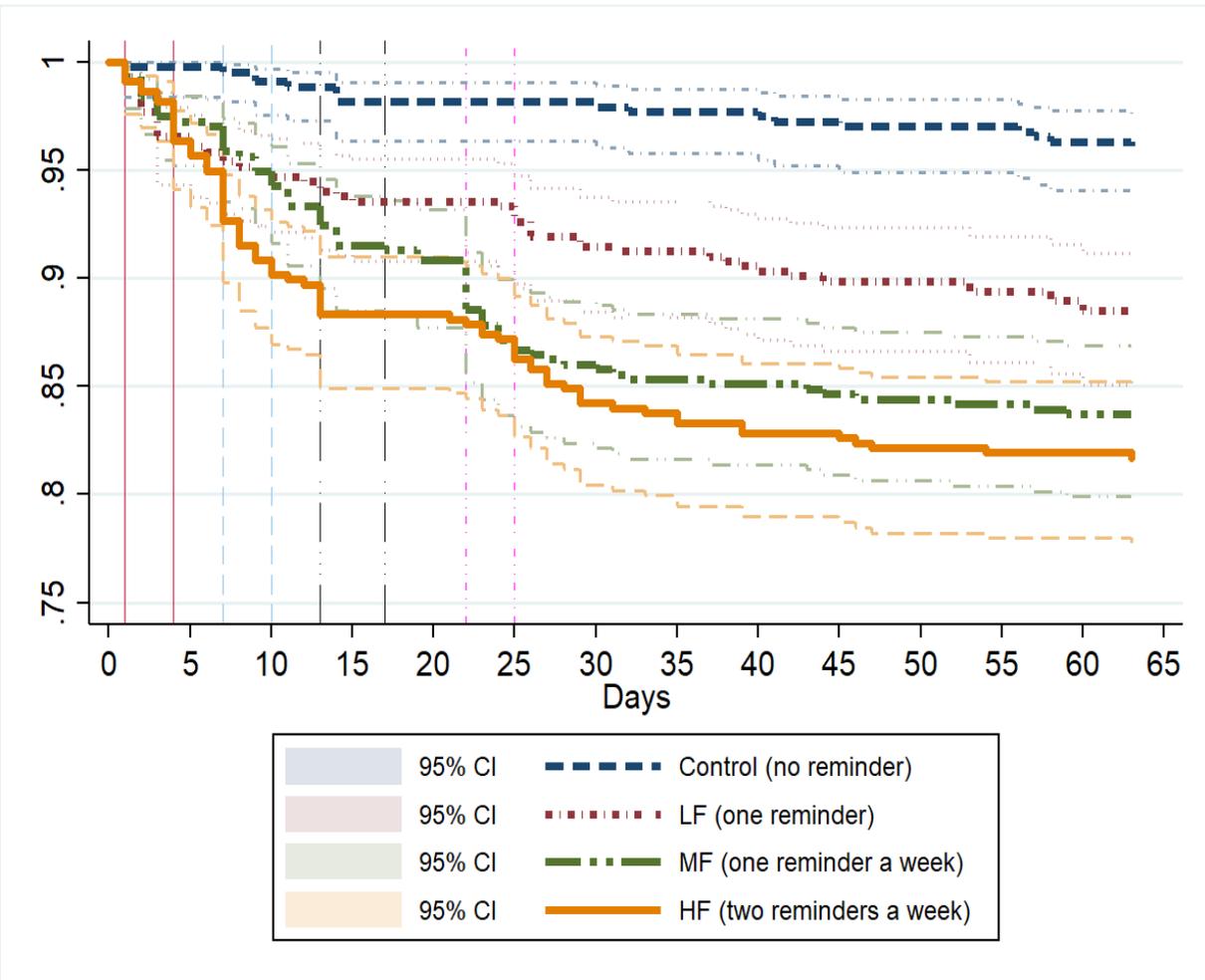
Result 3: Beyond a certain reminder frequency, the probability of tax compliance does not increase considerably in the number of reminders sent.

- the probability of tax compliance in *MF* increases by around 5 percentage points (or 40%) compared to *LF* (statistically significant)
- the probability of tax compliance in *HF* increases by around 2 percentage points (or 12%) compared to *MF* (statistically non-significant)

Results

X-axis: time in days ranging from 16.09.2019 until 18.11.2019 inclusive (i.e., the end of the trial),
Y-axis: illustrates the probability of surviving

- (Relatively) big drops in the share of non-compliant taxpayers on most of the reminder days compared to non-reminder days.
 - Support for the conjecture that frequent reminders either bring the pending payments to their mind or create sufficient payment pressure inducing them to act.



Conclusions

- Frequent reminders substantially increase tax compliance compared to non-frequent reminders.
 - Drives the taxpayers' attention to the pending payment and prompts them to act
 - Creates pressure for those taxpayers who repeatedly postpone the payment and do not want to pay (for instance, because of competing and more attractive spending or investment activities).
- Beyond a certain frequency the effect of additional reminders on the probability of tax compliance and on fiscal gains seems to decline, though the effect is still positive.
- Frequent nudging does not have long-lasting impact on taxpayers

Thank you!!

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