

Research Article

# Effectiveness of nudges on small business tax compliance behavior

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**Abstract:** There has been a surge of basic and applied interest in exploring how small changes in decision contexts might be used to improve heuristic decision-making, “nudging” decision-makers toward choices that increase individual and social utility. The present study tested the impact of three types of nudges on tax compliance among delinquent businesses (n=3,130) in the state of Pennsylvania: (1) sending reminder letters that almost identically matched original tax delinquency notices, (2) sending redesigned reminder letters that simplified text and layout, increased the salience of critical information, and included an “Act Now” urgency statement, and (3) sending redesigned reminder letters with handwritten notes on the envelope. Redesigned reminder letters significantly increased the number of business owners who responded and the amount of delinquency paid within 15 days of receiving the notices. The addition of a handwritten note on the outside of the envelope did not additionally increase response rates or payment amount. Although the effect sizes observed in this study were small, the potential impact is large given the number of delinquent businesses and the average amount of taxes owed in Pennsylvania.

Keywords: Nudges, Tax compliance, Behavioral insights

Supplements: [Open materials](#)

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## Introduction

Contemporary theories of population-wide behavior change emphasize two major influence pathways or strategies (Barrett, Tugade, & Engle, 2004; Chaiken & Trope, 1999; Evans, 2008; Mukherjee, 2010; Kahneman, 2011; Frederick, 2005; Petty & Cacioppo, 1986). The first or “system 1” (Kahneman, 2011) processing focuses on what is often called “peripheral” (Wagner & Petty, 2011) processing, consisting of low-effort, heuristic, or automatic responses to the environment. The context in which the individual

is placed often plays a decisive role here in determining the behavioral outcome, with different contexts “nudging” individuals toward different responses (see Thaler & Sunstein, 2008). The second strategy pursues behavior change by targeting deliberative processes of reasoning, attitude formation, and decision-making—often referred to as “central route” (Wagner & Petty, 2011) or “system 2” (see, e.g., Kahneman, 2011) thinking. Effective tools here include communication, mass media, and social marketing campaigns to create awareness or change attitudes by addressing reflective and conscious processes.

Building on this behavioral insight, targeted nudge interventions can be constructed to improve automatic decision-making by altering physical, social, and psychological aspects of the decision environment to increase the probability of individuals choosing better options for themselves and society at

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large (Thaler & Sunstein, 2008). Such approaches have steadily gained popularity in the past decade, including governments of many countries establishing nudge research teams to develop and experimentally test nudge-based policies (Holmes, 2018). Here we report on the results of one such effort in Pennsylvania focused on nudge approaches to increasing government revenue collection through business tax compliance.

#### *The Problem of Tax Compliance*

Following the financial crisis of 2008, policy attention to tax evasion and enforcement increased in developed countries. Special attention was paid to high-income individuals and corporations. In parallel, academic research into the causes of tax evasion and the effectiveness of enforcement initiatives has vastly expanded (Slemrod, 2018). The IRS's most recent tax gap estimates indicate that the overall gross federal tax gap for tax years 2008 to 2010 was \$458 billion, which amounts to 18% of the estimated actual tax liability (IRS, 2016). Small businesses represent a large portion of the tax gap; indeed, approximately 47% of underreporting of individual income tax comes from business income (Slemrod, 2018). These figures suggest that modest changes in tax compliance rates can translate to millions or even billions of dollars in additional revenue, which should in principle incentivize both the federal Internal Revenue Service (IRS) and state-level revenue departments to consider various levers for facilitating tax compliance.

Traditionally, tax administrators have focused on penalties to compel compliance, such as audits, legal enforcement actions, and use of private debt collectors. And for good reason: these approaches have a significant positive impact on tax compliance (Plumley, 2002; DeBacker et al., 2015; Advani, Elming, & Shaw, 2017).

Nevertheless, individualized audits and collections activities are inherently labor-intensive and costly to scale. By contrast, broad-based communications-oriented strategies are highly scalable and much less costly, making them a logical complementary approach. While targeted "high-touch" efforts can be focused on known or suspected offenders (and other random auditees), prevention-oriented approaches can be mechanically "blasted" (via direct mail, for example) to an entire segment of the tax base, providing upstream increases in compliance and leaving auditors and collectors to focus on the most recalcitrant

cases.

Additionally, broad-based mass-messaging approaches offer occasion for conducting well-powered randomized experiments, yielding insight into the marginal benefit of different communications strategies and tactics (e.g., message approaches, visual/graphic design variants). Following this logic, and stimulated by the recent attention to the nudge framework in particular, both the IRS FY18-22 Strategic Plan and the Taxpayer Advocate Service Annual Report to Congress (2016) have requested randomized controlled trials to quantify the tax compliance gains that result from nudge message strategies targeting broad segments of the tax base. Some state governments are following suit, including this test case, the Pennsylvania Department of Revenue (DOR).

#### *Pennsylvania as Case Study*

The Pennsylvania DOR recently experienced a significant revenue shortfall, with 2016-2017 collections approximately \$1 billion below projected budget estimates. In particular, tax revenue from businesses were identified as suffering the highest rate of non-compliance (Thompson, 2017). Pennsylvania is not alone: at least 19 other states experienced budget shortfalls for the same period, the largest number of states to report such shortfalls since the end of the Great Recession in 2009. Reasons for budget shortfalls include slow gross domestic product growth, lower oil and gas prices that decreased profits and employment in the energy sector, and lower consumer spending that translates to fewer sales tax collections. In this scenario, even small increases in business tax compliance rates could have substantial impacts on overall revenue capture.

Through a partnership with Pennsylvania DOR, we conducted a field experiment with more than 3,000 small businesses, testing whether nudges significantly impact business owners' payment of delinquent taxes owed. Though some field experiments have examined the effectiveness of nudges in this domain, the number is still too low for a meta-analytic review, and little is yet known about the range of impact and external validity of various nudges. We sought to address these questions and add to the broader evidence base by embedding nudge prompts in tax delinquency notice letters.

#### *Exemplary Message Strategies*

Drawing on the nudge-related literature, we identi-

fied three types of nudges for use in the redesign of the DOR's tax compliance communications: (1) reminders, (2) redesigned reminders that simplify text and layout, increase the salience of critical information, and include an "Act Now" urgency statement, and (3) redesigned reminders with handwritten notes on the envelope. Before introducing the details of our design, we briefly review each of these intervention strategies.

**Reminders.** Sunstein (2014) argues that such forces as inertia, procrastination, and the presence of competing working memory demands can lead people to neglect important actions through simple forgetfulness. A recent offshoot of behavioral public economics argues that individuals and firms are inattentive to certain aspects of a tax system that are not salient (Chetty, Looney, & Kroft, 2009). In keeping with this idea, previous studies have found that it is possible to increase tax compliance simply by sending reminder letters indicating that taxes were due (Kettle, Hernandez, Ruda, & Sanderson, 2016; Behavioral Insights Team, 2016; Guyton et al., 2016; Chirico et al., 2016).

**Simplification.** Cognitive simplification is the reduction of information-processing burden by highlighting key information (signal), eliminating extraneous information (noise), and increasing the salience of the recommended action the individual should take (Sunstein, 2014). In the context of official written communications, this entails reducing the amount of text, using simpler language, and placing key information where individuals are most likely to look. For example, streamlining and simplifying the content of a tax notice increases attention to the message (e.g., IRS, 2010, TAS, 2018), and taxpayers are more likely to comply (vs. default into nonpayment) when notices are reformatted to present a clear call-to-action (e.g., IRS, 2016, TAS, 2018). Indeed, a recent randomized controlled trial in London found that simplification increased the number of individuals who paid local taxes by four percentage points (John & Blume, 2019).

**Urgency Statements.** Recent work has shown that an urgency nudge in the form of a stamp (e.g., "pay now") can increase taxpayer compliance by 3% to 10% (e.g., Behavioral Insights Team, 2015; IRS, 2016). Likewise, changing a reminder letter to include language of "Pay Now" has led to increased compliance (Gamble, 2017).

**Handwritten note.** Handwritten notes (e.g., "You really need to read this") substantially increase

response rates to survey participation requests, medical treatment follow-up notices, invitations to participate in government conservation programs, as well as marketing solicitations, (e.g., Tullar, Katz, Wright, Fossel, Phillips, Maher, & Losina, 2004; Czap et al., 2019; Amos & Paswan, 2009; James & Li, 1993; Yu & Cooper, 1983; but see Gendall, 2005). Although this intervention has not yet been applied in the tax compliance domain, the large effect size observed in other domains suggested a manipulation worth testing.

**Deterrent message.** Tax compliance is legally sanctioned, and the communication of the likelihood of enforcement is more likely to be successful than messages with normative content (Blumenthal, Christian, Slemrod, & Smith, 2001; Coleman, 1996; Iyer, Reckers, & Sanders, 2010; Mieselman; Bergolo, Ceni, Cruces, Giacobasso, & Perez-Truglia, 2017). For example, communicating the likelihood of audit has been shown to work in both field randomized controlled trials (Kleven, Knudsen, Kreiner, Pedersen, & Saez, 2011; Slemrod, Blumenthal, & Christian, 2001, Kettle et al., 2016; Hasseldine, Hite, James, & Toumi, 2007) and laboratory experiments (Spicer & Thomas, 1982).

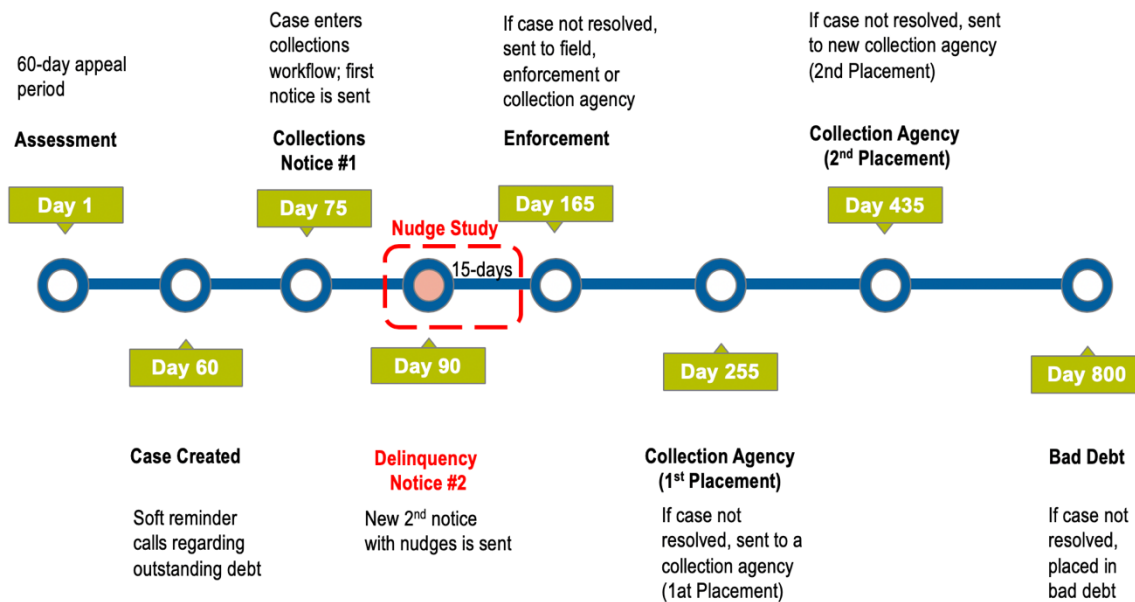
Similar to the other interventions, this intervention serves to increase the salience and concreteness of behavior-relevant information. Hallsworth, List, Metcalfe, and Vlaev (2014) found the speed with which taxpayers pay their liabilities can also be improved with increased fines. However, fines only work if taxpayers believe they will be enforced. Large fines may be seen by taxpayers as a signal of a desperate and ineffective tax collector (Cherico et al., 2016a).

We highlighted the deterrent message in Pennsylvania DOR delinquency letters (e.g., "If you do not contact the Pennsylvania Department of Revenue's Delinquent Call Center, you: May have a lien issued; May have your sales tax license revoked; May have a citation issued which can result in fines of up to \$1500; May have a bank account frozen and funds seized"), which served as a form of warning-oriented nudge (see Sunstein, 2014). Businesses are more likely to comply with taxes when reminded of the consequences of nonpayment (e.g., Shimeles, Gurara, & Woldeyes, 2017).

#### *The Tax Delinquency Process*

Pennsylvania businesses become delinquent when the due date for a tax return or other established lia-

**Figure 1**  
**Pennsylvania Business Tax Delinquency Process**



bility has passed and the amount due remains unpaid. At this juncture, the collection process (illustrated in Figure 1) is triggered.

First, the business enters a 60-day appeal period. If the debt is still not paid after 60 days, a case is opened, and a revenue agent makes soft calls reminding the business to pay their taxes. If the taxes remain unpaid at day 75, the first Notice of Delinquency is mailed to the business. Currently, this is the entirety of the follow-up process for the Pennsylvania DOR prior to turning to collections agencies. As noted above, the crux of our nudge intervention was to insert a new, reminder delinquency notice at Day 90 and measure the notice impact after a 15-day window.

## Methods

### *Participants*

The experiment was carried out on a sample of Pennsylvania small businesses ( $n = 3,130$ ) during the 2019 financial year. Pennsylvania DOR selected the study sample from businesses that had become delinquent and had entered their collections process, and who had not yet responded in any way prior to mailing the reminder letters. Businesses did not know that they were participating in an experiment.

### *Design and Reminder Conditions*

This field experiment consisted of a between-subjects randomized design, where the four reminder conditions served as the independent variable. Each business was randomly assigned to one of the following four conditions.

**No-Reminder condition.** Businesses assigned to this condition received the standard notice-of-delinquency letter but did not receive a second notice of delinquency. This is in line with current Pennsylvania DOR practice and served as our status quo control condition.

**Baseline Reminder condition.** Businesses randomly assigned to the second condition received reminder notices identical to the standard first notice used by Pennsylvania Department of Revenue except with the title change: “Second Notice of Delinquency.” The issuance of a reminder is itself a departure from status quo Pennsylvania Department of Revenue practice (i.e., an intervention in its own right).

**Redesigned Reminder condition.** Businesses in this condition received a second delinquency notice; however, the reminder delinquency notice explicitly incorporated nudge theory-informed components: use of simplified text and layout, increased salience of critical information, and an “Act Now” urgency statement. A brief narrative summary of these nudge components is provided here, and example

stimuli themselves are presented in the Appendix. The delinquency notice was redesigned to improve clarity, organization, and visual appeal. We focused on simple text that was understandable to the average person, and logical flow of information. We added clear, concise bulleted lists in the notice outlining taxpayer's options for response and made consequences of nonaction more salient. When notices are reformatted to clarify the actions recipients are being asked to take, taxpayers are more likely to comply than default into nonpayment (e.g., IRS, 2016). We added a "stamp" to the letter that stated, "Act Now."

#### **Redesigned notice Plus Note condition.**

Businesses assigned to the fourth condition received the same redesigned second delinquency notice as those in the Redesigned Reminder condition, but the former additionally received a handwritten message on the outside of the envelope that said, "You really need to read this."

The research was approved by MITRE's Institutional Review Board, MIRB 2018008 on 7 December 2017. The study was not preregistered.

#### *Procedure*

The Pennsylvania DOR distributed the three versions of the experimental reminder delinquency notices to businesses 90 days after they became delinquent (15 days after the first Notice of Delinquency was mailed). Compliance was assessed 15 days after the reminder notice was sent. For the no reminder condition, a corresponding 15-day window (Day 90 – Day 105 in the PA Delinquency timeline) was constructed from when the reminder letter would have been sent, even though no reminder letter was sent.

To identify delinquent taxpayers, PA DoR ran SQL queries against revenue data tables. They then ran filter queries to remove taxpayers that opted into e-notices, that had resolved the delinquency, and/or whose accounts had been locked. After generating this list, PA DoR randomly assigned participants to one of four conditions, using a randomization function in Excel. A second response query was conducted before printing notices to ensure that no new payments/resolutions had come in before notices were sent. PA DoR recorded the date that notices were sent to participants and checked four response types daily: inbound calls (including dates), promise-to-pay (installment plan) or arrangement with collections, partial payments (captured dollar amount and date), and full payments (captured dollar amount and date).

#### *Hypotheses*

We evaluated three main hypotheses:

*H1: Reminder letters will increase the number of businesses that respond and tax payment amounts in comparison with the no reminder condition, and effect sizes will be at or above the small level. In other words, we hypothesized that all three treatment conditions will have significantly higher response rates and payment amount as compared to the no reminder control condition.*

*H2: The redesigned reminder letter will increase response rates and payment amount above and beyond the baseline reminder condition.*

*H3: The personalized note condition will produce yet higher response rates and payment amount above the redesigned reminder letter alone.*

#### *Data Analysis*

To isolate effects due to the reminder notice, we dropped businesses that responded prior to Day 90 (e.g., some businesses responded to the initial notice). Additionally, we removed businesses that had multiple delinquencies. Combined, this brought our sample size from 4,800 to 3,130 businesses. Data were analyzed using one-way ANCOVA assessed the effect of study condition on payment amount controlling for the initial amount of taxes due. A priori, with a sample of 3,130 businesses, the study had high statistical power ( $>0.99$ ) to detect small effect sizes (Cohen's  $f=0.1$ ; Cohen, 1988) at the  $\alpha=0.05$  significance level. Given the study's large sample sizes, negligible differences could be statistically significant. Hence, our key focus was on effect sizes associated with statistically significant findings, using Omega-squared as our effect size measure.

#### *Condition Balance Checks*

We examined if there were differences among study conditions in tax balance due prior to sending reminder notices. Despite randomization, conditions differed reliably,  $F(3, 3126)=2.615$ ,  $p=0.0495$ . Using Tukey HSD post hoc tests, there were no differences among groups at the  $\alpha = 0.05$  level. The Redesigned Reminder condition had marginally larger starting tax balance due than the Baseline Reminder condition: Mean difference = \$56.38, CI difference =  $-\$0.40, \$113.17$ ,  $p=0.052$ . We used Analysis of Covariance to control for initial tax payment amount due when analyzing the effect of study condition on tax balance paid and whether businesses responded to the notices.

**Table 1**  
**Effect of Reminder Condition on the Number of Businesses that Responded**

	No Re- minder	Baseline Re- minder	Redesigned Reminder	Redesigned Re- minder + Note	Total
Responded	155 (19%)	202 (26%)	277 (36%)	293 (38%)	927
Did not Respond	649	583	490	481	2203
Total	804	785	767	774	3130

#### *Manipulation Checks*

Prior to the execution of the main study, we conducted a qualitative, pilot manipulation check of the two notices (baseline vs. redesigned reminder) to examine the effectiveness of letter simplification. We randomly assigned 21 participants to view one of the two notices. Participants rated the notice on a 7-point scale in terms of (a) overall impression of quality, (b) ease of understanding, (c) overall appearance (look and feel), (d) organization of information, and (e) clarity of information. The last item asked participants whether they understood what the notice of delinquency was asking them to do (yes/no/maybe).

A t-test was performed between the standard and redesigned notices to assess if the redesign notice was perceived more favorably. The scores suggested that the redesign notice was more favorable in terms of overall quality ( $M = 5.83$  vs.  $M = 3.82$ ,  $t(19) = 4.91$ ,  $p < .01$ ); ease of understanding ( $M = 6.00$  vs.  $M = 3.55$ ,  $t(19) = 4.54$ ,  $p < .01$ ); appearance ( $M = 6.17$  vs.  $M = 2.91$ ,  $t(19) = 6.49$ ,  $p < .01$ ); organization ( $M = 6.17$  vs.  $M = 3.55$ ,  $t(19) = 5.03$ ,  $p < .01$ ); and clarity ( $M = 5.75$  vs.  $M = 3.64$ ,  $t(19) = 3.89$ ,  $p < .01$ ). Of the pilot study participants, 92% of understood how to respond to the standard notice of delinquency, whereas 100% understood how to respond to the redesigned notice of delinquency. These qualitative pilot study scores indicated that the redesigned notice of delinquency was clearer and easier to understand than the original notice.

## **Results**

#### *H1: Reminder Letters Impact on Response Rates and Tax Payment Amount*

We hypothesized that reminder letters would increase the number of businesses that responded to

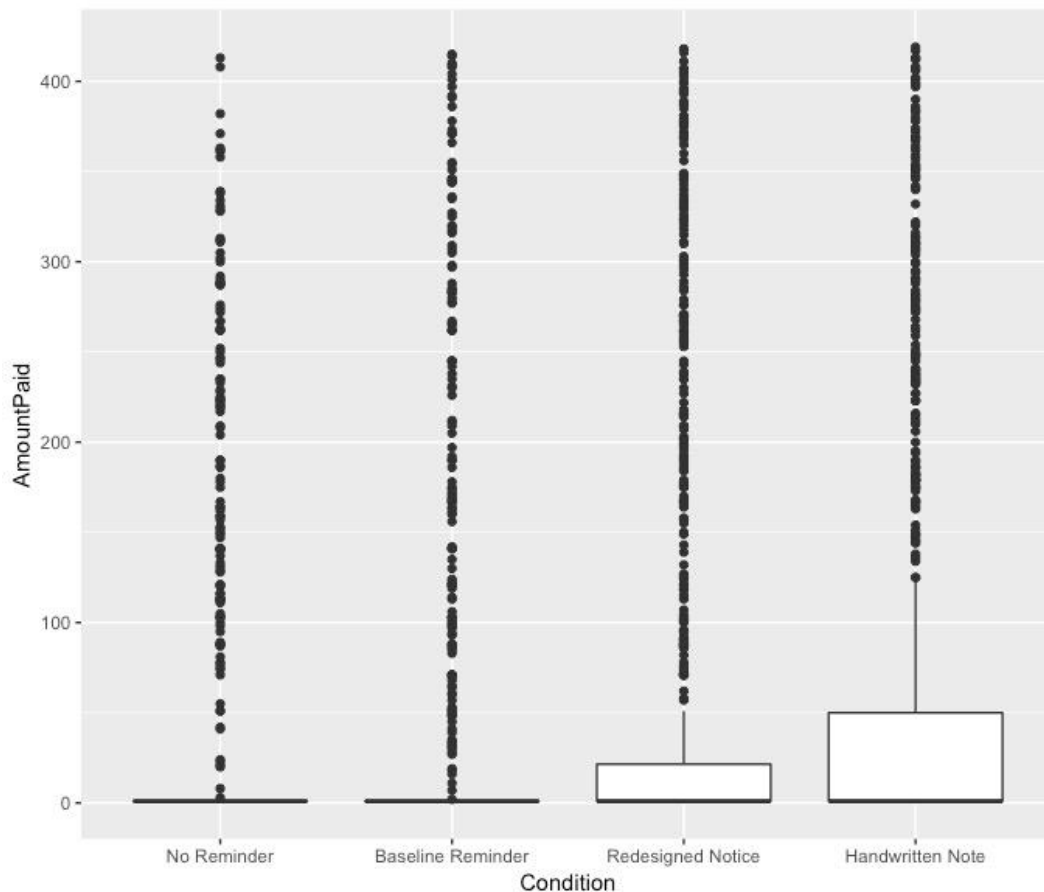
the notices by Day 105 and average payment amounts (the amount of a business's delinquency paid by Day 105) in comparison with no reminders. There was a significant effect of reminder condition on whether a business responded when controlling for the initial tax amount due,  $F(3, 3125) = 18.31$ ,  $p < 0.0001$  (see Table 1). In line with our hypothesis, using Tukey HSD post hoc tests we found more businesses responded in each of the reminder conditions than in the no reminder condition (Baseline Reminder vs. No Reminder: Mean difference = 0.064,  $p = 0.022$ ; Redesigned vs. No Reminder: Mean difference = 0.17,  $p < 0.001$ ; Redesigned + Note vs. No Reminder: Mean difference = 0.19,  $p < 0.001$ ).

There was a significant effect of experimental condition on payment amount controlling for initial tax payment amount owed,  $F(3, 3125) = 13.76$ ,  $p < 0.0001$ ,  $\Omega^2 = 0.01$  (see Figure 2). Using Tukey HSD post hoc tests, we found no difference between the No Reminder condition and the Baseline Reminder condition ( $p = 0.354$ ). However, both redesigned conditions had a higher payment percentage than the No Reminder condition (Redesigned Reminder vs. No Reminder: Mean Difference = 23.76,  $p < 0.001$ ; Redesigned Reminder + Note vs. No Reminder: Mean Difference = 26.72,  $p < 0.001$ ).

#### *H2: Redesigned Reminder Letter Impact on Response Rates and Payment Amount*

We hypothesized that the redesigned reminder conditions would have higher response rates and payment amounts than the Baseline Reminder condition. Using Tukey post hoc tests, we found that the number of businesses that responded in each of the redesigned reminder conditions was higher than in the Baseline Reminder condition (Redesigned Reminder vs. Baseline Reminder: Mean difference = 0.10,  $p < 0.001$ ; Redesigned Reminder + Note vs. Baseline

**Figure 2**  
**Effect of Reminder Condition on Payment Percent**



Reminder: Mean difference = 0.12,  $p < 0.001$ ). Moreover, using Tukey post hoc tests, both redesigned reminder conditions had higher tax payment amounts than the baseline reminder condition (Redesigned Reminder vs. Baseline Reminder: Mean Difference = 15.81,  $p = 0.007$ ; Redesigned Reminder + Note vs. Baseline Reminder: Mean Difference = 18.77,  $p < 0.001$ ).

*Redesigned Reminder + Note Impact on Response Rates and Payment Percentage*

We hypothesized that adding a handwritten note on the envelope would increase response rates and payment percentage yet above the redesigned reminder. In contrast, we found no difference between the Redesigned Reminder and the Redesigned Reminder + Note conditions for the number of businesses that responded (Tukey HSD mean difference = 0.02,

$p = 0.880$ ) or amount paid (Tukey HSD mean difference = 2.96,  $p = 0.932$ ).

*Exploratory Dependent Variable: Reminder Impact on In Full Tax Payment*

In addition to testing the three main hypotheses, we additionally examined the effect of reminder letters on the percent of delinquent businesses that paid their taxes in full (i.e., no balance by Day 105). There was a significant effect of reminder condition on whether a business paid their balance in full during the second letter period,  $\chi^2(3, n = 3130) = 20.78$ ,  $p = 0.0001$  (see Table 2).

There was no difference in the percentage of businesses that paid in full in the No Reminder vs. Baseline Reminder condition,  $p = 0.306$  at the Bonferroni-adjusted alpha value of 0.0125 for four comparisons. The redesigned reminder condition had a

higher percentage of businesses paying off their balances in full than the Baseline Reminder condition at the Bonferonni-adjusted alpha value of 0.0125 for four comparisons: Redesigned Reminder vs. Baseline Reminder:  $\chi^2(1, n = 1552) = 7.92, p = 0.005$ . The Redesigned Reminder + Note condition had marginally significant higher percentage of businesses paying off their balances in full than the Baseline Reminder at the Bonferonni-adjusted alpha value of 0.0125 for four comparisons:  $\chi^2(1, n = 1559) = 6.04, p = 0.014$ . There was no difference between the nudge conditions at the Bonferonni-adjusted alpha value of 0.0125 for four comparisons,  $\chi^2(1, n = 1541) = 0.13, p = 0.715$ .

### Discussion and Conclusion

This study focused on three types of nudges for the redesign of Pennsylvania DOR communications to increase tax compliance among delinquent businesses ( $n = 3,130$ ) using a randomized field experiment: (1) the use of generic reminder notices (vs. no reminder), (2) the use of enriched reminders that included simplifying and salience-increasing features, and (3) the addition of handwritten notes to the other nudge enrichments. In line with our hypotheses, we found that reminder letters of any type increased business response rates, though only the two redesigned reminder letters additionally increased the percent of owed taxes paid. Moreover, the two redesigned reminder letters increased response rates and payment percentage above and beyond the baseline reminder letters. Contrary to our hypothesis, the addition of a handwritten note on the outside of the envelope did not additionally increase response rates or payment percentage. It is unclear why handwritten notes did not improve tax compliance, though it is possible that notes are more effective with mail from non-government sources. Traditionally, research

supported the claim personalized mail could increase response rate for direct mail marketing (Direct Marketing Association, 2012) and there is even a communications industry that specializes in handwritten mail. However, more and more research is finding personalization is not as effective as it once was. For example, Gendall (2005) found no effect of handwritten notes on response rates to the International Social Survey Programme survey among 2000 members of the New Zealand general public, and he argued that personalization may no longer be perceived as novel.” Our research also suggests new engagement strategies need to be developed.

Although the effect sizes observed in this study were small ( $\Omega^2 = 0.01$ ), the potential impact is large. Pennsylvania has approximately 30,000 delinquent businesses each year that owe on average \$10,954 at the time of Day 90. If the present redesigned reminder letters were mailed to all delinquent businesses, and assuming the impacts on payment percentage held across this population (i.e., an increase from 13% to 22% of owed taxes paid), it could translate to \$29,000,000 additional revenue recovery. Moreover, this study only examined a short, 15-day response window. It is possible that additional positive impacts could be seen by following businesses for a longer duration after mailing the reminder letters. Likewise, further positive impacts might be realized if the redesigned nudge letters were sent out initially in lieu of the standard initial Notice of Delinquency.

Strengths of the study include the high statistical power to observe even small effects and the use of a randomized field experiment with real businesses. Both features increase the internal validity of the findings. Finally, the testing of multiple conditions allows for some provisional insight into the relative impact of different nudge component sets, suggesting that nudge interventions like these are generally ef-

**Table 2**  
**Effect of Reminder Condition on Full Payment**

	No Re- minder	Baseline Re- minder	Redesigned Reminder	Redesigned Re- minder + Note	Total
Paid in Full	67 (8.3%)	77 (9.8%)	111 (14.5%)	107 (13.8%)	362
Did Not Pay in Full	737	708	656	667	2768
Total	804	785	767	774	3130



fective but that some components may be more impactful than others. Additional applied or basic (e.g., analogue) research could shed further light into which components or combinations of components are most robustly impactful and which are marginal or interchangeable in their expected impact.

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# Appendix

## Nudge Delinquency Letters

### Original Notice of Delinquency

Page 2 of 3



**pennsylvania**  
DEPARTMENT OF REVENUE

BUREAU OF COLLECTIONS AND TAXPAYER SERVICES  
PO BOX 28143  
HARRISBURG, PA 17128-1041

**NOTICE OF DELINQUENCY**

REVENUE ID: [REDACTED]  
FEIN: [REDACTED]  
NOTICE NUMBER: [REDACTED]  
MAIL DATE: [REDACTED]

TO AVOID ADDITIONAL CHARGES,  
PAY AMOUNT DUE BY: 08/15/2017

Department records reflect delinquencies on this tax account as shown on the reverse side of this notice. The above-referenced taxpayer must file all delinquent returns and pay all outstanding balances within 10 days of the date of this notice to avoid further collection procedures.

We encourage you to take this opportunity to address your tax delinquency. If you fail to do so, your account may become subject to additional penalties and fees, estimated tax assessment, revocation of license, administrative bank attachment, and/or referral to a collection agency where additional fees up to 39 percent of the amount due may be added to the liability.

If you went out of business, have questions or already filed the returns(s) and paid all taxes, please call the number below to discuss your account with a department representative.

Delinquent Call Center  
717-783-8434  
1-800-447-3020 (Services for taxpayers with special hearing and/or speaking needs)

All payments of \$1,000 or more must be made electronically or by certified or cashier's check. Automated clearing house (ACH) debit transactions can be made through e-TIDES ([www.etides.state.pa.us](http://www.etides.state.pa.us)) and TeleFile (1-800-748-6299), and credit or debit card payments can be made through Official Payments Corp. ([www.officialpayments.com](http://www.officialpayments.com) or 1-800-2PAYTAX). Taxpayers may also pursue ACH credit transactions through their banks.

Certified or cashier's check must be remitted in person or by express mail courier by 4 p.m. of the tax due date to:

PA Department of Revenue  
Bureau of Business Trust Fund Taxes EFT Unit  
9th Floor Strawberry Square  
Fourth and Walnut Streets  
Harrisburg, PA 17128-0908

Please include the PA Account number, Entity ID (EIN/SSN or 10-digit Revenue ID), and tax period end date on the certified/cashier's check.

Page 2 of 3

**STATEMENT OF ACCOUNT**


This statement may not include all periods with outstanding liabilities. Periods involving prepetition bankruptcy liabilities or periods with an open appeal are not listed on this statement.

TAX TYPE	TAX ACCOUNT ID	TAX PERIOD BEGIN DATE	TAX PERIOD END DATE	PERIOD STATUS	TAX	PENALTY	INTEREST	TOTAL
FRAN	[REDACTED]	01/01/2014	12/31/2014	U	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
FRAN	[REDACTED]	01/01/2013	12/31/2013	U	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
							LEGAL FEES:	[REDACTED]
							AMOUNT DUE:	[REDACTED]

Total column totals less account any payments already applied.


PERIOD STATUS KEY:  
 N NONFILED PERIOD  
 A LIABILITY STILL WITHIN APPEAL PERIOD  
 U UNDERPAID PERIOD  
 O OVERPAID PERIOD

Redesigned Reminder Letter




Bureau of Collections and Taxpayer Services  
PO Box 281041  
Harrisburg, PA 17128-1041


Revenue ID	XXXXXXXX
FEIN	XXXX
Notice number	XXXXXXXX
Notice date	XX/XX/XXXX
To contact us by phone	717-783-8434 1-800-447-3020 for special hearing and/or speaking needs



[TAXPAYER NAME]  
[TAXPAYER STREET]  
[TAXPAYER CITY], [STATE], [ZIP]




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**Billing Summary**

Amount you owed	\$1,076.63
Decrease in tax	- 963.00
Decrease in interest	- 89.03
<b>Amount due by [date]:</b>	
<b>[\$XXX.XX]</b>	


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**What you need to do immediately**

1. Pay the amount due of \$[XXX.XX] in full by [date]
- or-
2. Contact the PA Department of Revenue's Delinquent Call Center, at 717-783-8434
  - If you cannot pay the amount due immediately
  - If you went out of business
  - If you have already filed your return or made payment arrangements

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**If we don't hear from you**

**If you do not contact the PA Department of Revenue's Delinquent Call Center, you:**

- May have a lien issued. This means that you may not be able to sell property or acquire a loan.
- May have your sales tax license revoked
- May have a citation issued which can result in fines of up to \$1500
- May have a bank account frozen and funds seized
- May be referred to:
  - A field collector
  - The Office of Attorney General
  - A third-party collection agency with an additional fee between 13% and 39% added to the amount you owe

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**How to pay**

- Online using e-TIDES ([www.etides.state.pa.us](http://www.etides.state.pa.us)) or Telefile ([www.officialpayments.com](http://www.officialpayments.com))
- By phone using TeleFile (1-800-2PAYTAX)
- By bank using ACH credit transactions
- By express mail courier or in person using certified or cashier's check. Include the PA Account number, Entity ID (EIN/SSN or 10-digit Revenue ID) on the certified/cashier's check.

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**If you have questions, call us at 717-783-8434.**