

# Increasing Public Debt Collection With Nudging: Results of Two Natural Fields Experiments

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## Abstract

Using two natural field experiments, we tested whether nudging could contribute as a cost-free instrument to increase voluntary public debt collection. We manipulated standard reminder notices sent to two samples ( $N = 396$  and  $N = 549$ ) with public debt in a municipality in Denmark, a country with a high tax morale. Results from both studies showed that initial debt payment rates were significantly higher in intervention groups receiving a simplified, kind, and attractive reminder notice as compared to a control groups receiving a standard and complex reminder notice. The results suggest that nudging may contribute to public debt collection in countries with a high tax morale.

## Introduction

Effective collection of taxes and public debt is foundational for all developed societies. It is what enables governments and local authorities to fund vital public services such as education, healthcare, and defence. High levels of uncollected taxes force public authorities to increase spending on tax audits and tax administration, which may lead to higher taxation or decreased funding for public services. Furthermore, uncollected taxes erode public tax morale, thus creating a vicious spiral of noncompliance (Alm, 2012).

The magnitude of tax gaps is difficult to measure, however, some studies show that uncollected taxes are a major challenge in many developed countries. In the US, data from 2008-2010 suggests that some \$458 billion in taxes goes uncollected annually (Internal Revenue Service, 2016). Moreover, data from the European Commission suggests that 20–25 percent of GDP in southern European countries such as Italy and Greece operates in a shadow economy where taxes are usually not paid (European Commission, 2013).

Interest in tax noncompliance and debt collection methods has increased among policy-makers in recent years, a surge that may be attributed to the financial crisis in 2008 and an increasingly complex and challenging global economic environment (Hallsworth, 2014; Pickhardt & Prinz, 2014; Internal Revenue Service, 2013). The recent leak of the Panama papers, for instance, is a testament to widespread and advanced international tax evasion that warrants a political reaction (Chohan, 2016). Another contributory factor driving political interest is a political shift within public agencies toward new public governance and a focus on user-centred and co-created public services (Pestoff, 2014). However, political interest is also driven by recent theoretical and empirical developments. In particular, cross-disciplinary work from behavioural economics and social psychology has generated an extensive body of studies that

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suggest user-friendly and even kind taxation services may not necessarily mean less effective taxation services (Hallsworth, 2014; Pickhardt & Prinz, 2014; Slemrod & Weber, 2012).

Most of these tendencies apply to Denmark, a small European welfare-state with 5.7 million inhabitants and a strong national tax morale (Alm & Torgler, 2006). Public debt has risen in Denmark since a large government-led automated recovery system was suspended in 2015 due to critical errors and illegal recovery of debt and taxes. By January 2017, Danish citizens owed public authorities 100 billion kroner (\$15 billion). This particularly hurts local authorities with a low level of budgetary flexibility. A prime example can be seen in Aarhus Municipality, the second largest municipality in Denmark with about 300,000 inhabitants. Public debt here totalled more than 400 million kroner (\$60 million) in January 2017, and the debt is currently rising by about 10 per cent per year. These substantial increases in public debt are placing a strain on the city budget and may ultimately result in increased taxation and cuts to services. To counter this development, Aarhus Municipality decided to test new approaches to effective tax and debt collection.

## Theoretical background

According to the dominant approach to tax noncompliance, the economic deterrence approach, citizens intentionally refrain from paying their debts and taxes either because they are not able to pay them because of liquidity constraints, or because they believe the costs of paying outweigh the benefits (Allingham & Sandmo, 1972; Milliron & Toy, 1988; Srinivasan, 1973). The approach is rooted in rationalistic theories, with individuals viewed as rational decision makers with perfect information, who seek to maximise their economic utility by carefully weighing the expected costs and benefits of their options (Becker, 1968).

Following the economic deterrence model, the most prized tool for incentivising payment of taxes and debt is to deter citizens by increasing the economic costs of not paying (i.e., increasing the size and immediacy of economic sanctions) and increasing the probability of getting caught through more tax audits (Alm, Jackson, & McKee, 2009; Witte & Woodbury, 1985). In a communicative context in relation to public management, this entails deterring citizens by informing them of these audits and sanctions, often in threatening language (Feld & Larsen, 2012). However, the empirical findings regarding the effectiveness of economic deterrence are mixed (Alm, 1999; Cuccia, 1994; Feld, 2009; Richardson & Sawyer, 2001), a finding that resonates with studies on the effectiveness of increasing levels of punishment, surveillance, and enforcement of crime on crime deterrence (Chalfin & McCrary, 2017). Whereas several studies have found that threats of tax audits and economic sanctions have a positive effect on tax compliance, studies also show that these compliance tools do not have a linear positive effect on individual payment compliance (Fischer, Wartick, & Mark, 1992; Jackson & Milliron, 1986; Witte & Woodbury, 1985; see also Hallsworth, 2014 for a review of natural field experiments).

In addition, some studies suggest that economic deterrence may backfire, as it may crowd out moral motivations for paying one's debts (Frey, 1997; Frey & Jegen, 2001; Heyman & Ariely, 2004). This is worrying, as many studies have

shown that concerns about social norms and moral obligations are important motivational drivers of tax compliance (see for example Kaplan & Reckers, 1985; Reckers, Sanders, & Roark, 1994). This mirrors recent psychological studies that demonstrate the power of morality and the need for positive self-regard in driving costly compliance (Mazar, Amir, & Ariely, 2008; Shu et al., 2012). In support of the crowding out hypothesis, in a seminal field study Gneezy and Rustichini (2000) found that introducing an economic fine for collecting children too late from day care centres in Israel only increased the problem of late-arriving parents. Evidently, many parents considered the new fine a reasonable price to pay in order to get more work done without feeling guilty.

The lack of clear empirical support and concerns regarding possible crowding out effects has given way for an alternative approach to debt collection and taxpayer noncompliance. According to the behavioural approach, tax noncompliance is caused by many psychological factors in addition to liquidity constraints and lack of economic sanctions. These psychological factors relate to the individual (e.g., social and economic background, perceived moral costs, individual habits, subjective beliefs regarding tax fairness and social norms, etc.) and to the particular situations where citizens decide whether to pay or not (e.g., information available, attention allocated to reminder notices, opportunities for paying, the difficulty of paying, etc.) (Andreoni, Erard, & Feinstein, 1998; Hallsworth, 2014; Kirchler, 2007; Smith & Kinsey, 1978; Torgler, 2007). Hence, according to the behavioural approach, some individuals might end up not paying their taxes and debts, not because they deliberately intend to cheat, but because they do not understand the tax rules and/or their bills, they forget to pay, they do not know how to pay, or a combination of all of these reasons. This invites a different way of thinking about the underlying motivations of citizens' noncompliance, and it points to a different way of thinking about effective behaviour-changing policies and communication in relation to increasing tax compliance and debt collection. Here, debtors need easy-to-comprehend and respectful information, rather than economic threats. Hallsworth (2014) reviewed natural field experiments testing the effectiveness of using nondeterrence measures to increase tax compliance. His review criteria included 15 studies, and their combined results are mixed. Hallsworth (2014) also noted, however, that the experimental manipulations undertaken in these studies varied considerably. Thus, from this review it is clear that a lack of theoretical convergence and systematic predictions prevent firm conclusions being made on the effectiveness of the behavioural approach to tax noncompliance.

The Behavioural Insights Team (BIT) has been working systematically with national and local tax collection authorities in the UK for a number of years in order to increase tax compliance and debt collection with nudging. Nudge-founders Richard Thaler and Cass Sunstein (2008) define nudging as cost-effective ways of influencing individuals' decisions in a self-interested way without constraining individuals' choice sets or making certain options more expensive. According to the nudge approach, most people want to do the right thing, and many behavioural problems are often caused by psychological and situational barriers, such as individuals' routines and habits, lack of attention, motivation, and self-control in critical decision-making contexts, and the use of cognitive biases in decision-making (Thaler & Sunstein, 2008). The BIT have

summarised their recommendations on how policy makers may apply nudging to affect behavior change in practice in the easy, attractive, social, and timely (EAST) model (Service et al., 2014). Below, these recommendations are briefly described as several of them were implemented in the present studies.

**Easy.** Making target behaviors easy includes reducing citizens' mental, physical, and monetary strains of performing the desired behavior (Fogg, 2009; Service et al., 2014). Harnessing the power of defaults and thus removing any action required has in particular been shown to be effective, but more incremental hassle-freeing procedures have also proven effective (i.e., one-click shopping, using direct-to-form URLs). Similarly, the BIT argues that simplification techniques increase response rates to public forms and letters significantly (Service et al., 2014). The BIT's recommended simplification techniques include presenting the key message early, using simple language, being specific about recommended actions, and removing irrelevant information (Service et al., 2014). The effectiveness of simplification may be attributed to simple information being easier to encode and process. Ease of processing, in turn, makes information seem more positive and more truthful, ultimately motivating more favorable behavioural intentions (Reber, Winkielman, & Schwarz, 1998; Reber & Schwarz, 1999).

**Attractive.** Decades of studies in marketing and consumer behavior have demonstrated the superior strategy of emotional advertising (Pringle & Field, 2009). This mirrors recent focus on influential decision-making theories, where emotions are seen as dominant drivers of human decision-making (Damasio, 1994; Forgas, 2008; Kahneman, 2011; Lerner et al., 2015). Paying your taxes and your debt can hardly be framed as an attractive behaviour, but nonpecuniary ways of stimulating positive emotions in debtors exist, thus making payment less unattractive. One way is to make reminder notices more personal. Haynes et al. (2013), for instance, found that reminder text messages including the recipient's name, significantly increased payment of delinquent fines as compared to generic text messages. Similarly, public requests may be perceived more favorably when they are kind. As shown by Robert Cialdini's (2006) extensive research in persuasion, individuals are more likely to comply with messages they like, and individuals feel inclined to reciprocate kindness and fairness shown toward them. Finally, adding images that induce positive emotions may make public messages more attractive. Eye-tracking studies show that images often draw disproportionately large attentional focus, and, in particular, images of babies, individuals smiling, attractive individuals, individuals in distress, and other compelling images, elicit emotional responses. One study, for instance, found that adding a picture of an attractive woman to a loan proposition increased recipients' demand for a loan (Bertrand et al., 2010).

**Social.** According to Hallsworth et al. (2014), procrastination is a large barrier for many late tax payers, and tax authorities may reduce taxpayers' propensity to procrastinate by increasing moral costs of procrastinating. In 2011–2012, the BIT conducted two large natural field experiments on tax collection in the UK including more than 200,000 UK citizens. Here they nudged citizens using reminder notices to observe effects of subtle differences in wording and information in the notices on the payment rates. The experiments found that payment rates were significantly higher in groups receiving reminder notices that

included information about the high tax compliance among citizens living in the same neighborhood as the recipient (Hallsworth et al. 2017). This nudge demonstrated the effect of harnessing positive social norms in public debt collection (Cialdini 2006). Including moral appeals has also been shown to have a positive effect on tax compliance. In a large natural field experiment in Norway, including moral appeals in letters almost doubled the reported average foreign income compared to a standard letter (Bott et al., 2014). Also, Perez-Truglia, and Troiano (2015) showed that moral costs induced by public shaming increase taxpayers' propensity to pay off their debts. As of 2016, 23 US states encourage delinquents to pay their debts and taxes by threatening delinquents with publishing their names and debts online.

**Timing.** Finally, several studies have shown positive effects of timing public requests. For instance, SMS reminders have been found to increase payment of delinquent fines (Haynes et al., 2013) and to reduce patient no-shows at hospitals and small health care centers (Gurol-Urganci et al., 2013; Robotham et al., 2016). The successful Save More Tomorrow pension enrollment plan has also showed that voluntary participation in pension plans is sensitive to the timing and progression of fund allocations (Thaler & Benartzi, 2004).

## Research design and data

The aim of the present field experiments was to test the effectiveness of using different nudges as cost-free instruments in public debt collection. If nudging could aid in debt collection, this would suggest that many debtors fail to pay their debts because they procrastinate or do not know how to pay their debts, and, not because they are economically constrained or intend to cheat. We conducted two natural field experiments in cooperation with the local government of Aarhus, a city with 300,000 inhabitants in Denmark. Natural field experiments have multiple advantages over traditional tax evasion measures, including collecting behavioural data in real-world surroundings, and, at the same time allowing high causal inference (Hallsworth, 2014; Levitt & List, 2007). Also, Denmark presents itself as an interesting avenue for testing the effectiveness of nudging voluntary debt payments because Danes have a relatively high tax morale (Alm & Torgler, 2006; Kleven et al., 2011), which, as shown by Cabral, Kotsogiannis, and Myles (2015), is a factor that makes economic deterrence less effective. Other studies point to the same conclusion: nondeterrence measures seem to be more effective on individuals that usually comply with tax rules (Castro & Scartascini, 2015; Dwenger et al., 2016). Hence, given that the success of nudging rests on some level of existing motivation to comply with the behavioural goal of the nudge, Denmark, with its relatively high levels of tax morale, makes for a suitable sample for testing the effectiveness of nudging.

We nudged the standard reminder notices for day care in two different studies and measured how nudging reminder notices would fare compared to standard reminder notices in relation to observed voluntary debt payments. In the Municipality of Aarhus, about 7 percent of day care users do not pay for public day care services on time. In study 1, we tested how nudging reminder notices would fare against a standard reminder notice based on economic deterrence. The nudges included simplification techniques, kind communication, and an

increase in the notices' general attractiveness. In study 2, we investigated how nudging reminder notices would fare against a standard reminder notice that did not include references to future economic sanctions in case of continued noncompliance. As in study 1, the nudges applied in study 2 included simplification techniques, kind communication, and an increase in the notices' general attractiveness. In both studies we use field experiments with random treatment allocation (Hallsworth, 2014).

## Study 1

### Design, variables, and procedure

The local authorities in Aarhus allowed us to conduct our experiment on all citizens who had not made payments for public day care in May 2014, totalling 396 individuals. The sample arguably included a mix of debtors who procrastinated, debtors that were unwilling to pay, and debtors that were unable to pay off their debts. Given that previous nudging experiments within debt collection often find effects of single nudges (e.g. adding one line of information, using personal addressing, etc.) of around 5 % increases in payment (see e.g. Service et al., 2014; Hallsworth et al., 2017; Haynes et al., 2013), the relatively low sample size challenged us to establish large group differences to be detectable with statistical certainty (i.e.  $\alpha = .05$  and  $\beta = .20$ ). This encouraged us to constrain the number of intervention groups, and to pool multiple nudges in each of the intervention groups. Thus, the 396 debtors were randomly allocated to three groups. A control group (N = 133) received the standard reminder notice, whereas intervention group 1 (N = 131) and intervention group 2 (N = 132) received new nudging reminder notices. The reminder notices were mailed in classic, physical form to the groups. For day care services, the municipal debt collection procedure included dispatching two reminder notices (one month apart) before sending the debt for recovery by the national tax authority, SKAT. Including a second data measurement after a second reminder notice enabled us to investigate whether potential nudging effects would persist over time. Hence, we measured voluntary debt payments in two different time intervals: after receiving the first reminder notice and after receiving a second reminder notice. Reminder notice #1 was sent on May 22 2014, and reminder notice #2 was sent to debtors that did not pay reminder notice #1 on June 20 2014. Payment was due 20 days after receiving a notice. For each group, reminder notice #1 and reminder notice #2 was almost identical, the only difference being an added \$35 late fee to reminder notice #2. A visual representation of the timeline of the reminder notices can be seen on Figure A0 in the appendix.

**Reminder Notice Sent to Control Group: Complex and Deterring.** The standard reminder notice (see Figure A1 in appendix) was a two-page letter that included a textbox specifying the amount due (including a late fee of \$35), a payment slip, and a 200-plus word text informing the debtor about the legal and economic consequences of continued nonpayment. The stated consequences include added costs from interest rates and withholding future salary and/or welfare payments. Prior to the study, we interviewed four citizens from the target group about their impressions of the notice. Three impressions were shared among them. One impression was that the language was difficult to

understand as it included technical legal language. For instance, the notice included the word “arrears” (Danish: “restance”), a word used seldom in the Danish language. The notice also made explicit references to governmental laws and their corresponding judicial paragraphs. A second impression expressed in the interviews was that the language was threatening. A final impression was that the layout was dull and confusing. For instance, the notice did not have a title, some found the placement of the contact telephone number illogical, and the notice had an unusual page break. These impressions indicated that the notice reflected common assumptions held in rational choice theory and the general economic deterrence model (i.e., that debtors pay close attention to all information that affect their economic utility, and that debtors are highly motivated by economic sanctions). In addition, the notice assumed that recipients understand complex legal language. Hence, as argued above, the implicit assumption embedded here is that if citizens do not pay their debts and taxes, it is because they are economically constrained or because they have reasoned that the costs of paying outweigh the benefits.

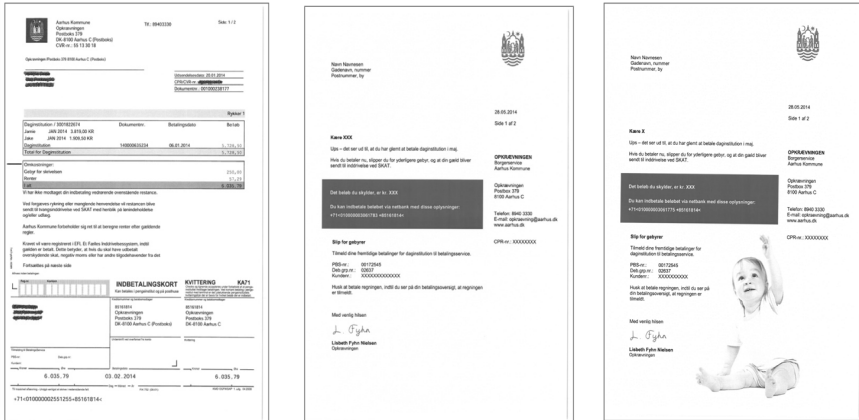
**Reminder Notice Sent to Intervention Group 1: Simple and Kind.**

Compared to the reminder notice sent to the control group, the reminder notice sent to intervention group 1 was simple and kind (see Figure A2 in appendix). First, the notice used simple rather than complex language. Similarly, we removed references to governmental laws and judicial paragraphs. Second, with a green textbox we highlighted key information: the amount due and the account number needed to make a web-based account transfer. Third, we moved less important information (i.e., specification of the debt, thorough description of the consequences of not paying, and the payment slip) to page two to get recipients to focus on the important information. Fourth, we cleaned up the letter head. As to making the reminder notice kind, the notice was addressed to “Dear FIRST NAME”, and, we added a personal sender to the notice with a signature. Finally, the notice started with “Oops, it seems you forgot to pay for day care in May.” This sentence aimed at setting a forgiving tone in the notice rather than a threatening one. Information regarding economic consequences of continued nonpayment was, however, still present. Below the forgiving sentence it read, “If you pay now, you avoid additional charges and your debt being sent to recovery by SKAT.” In addition to these simplification and kindness nudges, on page one we also added a guide to set up future government invoices for automatic payment.

**Reminder Notice Sent to Intervention Group 2: Simple, Kind, and Attractive.**

The notice sent to intervention group 2 was identical to the notice sent to intervention group 1, but it also included a large picture of a 9-month-old baby looking at and pointing to key information in the notice (see Figure A3 in appendix). The goal was to increase visual attention toward call to action information. The choice of picture reflects three considerations. First, we utilised the empirical finding that pictures of babies generate attention, positive emotion, and caretaking behavioural tendencies in individuals (Brosch, Sander, & Scherer, 2007; Glocker et al., 2009). Second, we utilised the empirical finding that individuals spontaneously follow another person’s eye gaze (Driver et al., 1999; Emery, 2000). Third, the baby resonated with the target group: parents with small children in public day care.

Figure 1. Reminder notices sent to the three groups in study 1 (page 1 only).



From the left: control group, intervention group 1, intervention group 2.

**Hypothesis 1.** We hypothesised that both of the new nudging reminder notices would encourage more debtors to pay off their debts when compared to the standard reminder notice. Hence, we hypothesised that the proportion of paying debtors would be higher in intervention group 1 and intervention group 2 after receiving reminder notice #1 when compared to the control group.

**Hypothesis 2.** We hypothesised that the nudging reminder notice with a picture of a baby would encourage more citizens to pay off their debts when compared to the nudged reminder notice without a picture of a baby. Hence, we hypothesised that the proportion of paying debtors would be higher in intervention group 2 than in intervention group 1 after receiving reminder notice #1.

**Hypothesis 3.** Given that we expected a large portion of the procrastinators in the two intervention groups to have paid off their debts after receiving reminder notice #1, we hypothesised that among debtors who received reminder notice #2, no payment differences would be found between the groups.

**Hypothesis 4.** Combining results from both reminder notices, we hypothesised that the total proportion of paying debtors would be higher in intervention group 1 and intervention group 2 as compared to the control group. Similarly, we hypothesised that the total proportion of paying debtors would be higher in intervention group 2 than in intervention group 1 after receiving both reminder notices.

**Results**

After receiving reminder notice #1, 147 debtors (37.1%) paid off their debts. To test hypothesis 1, a chi-square test of independence was performed to examine the relation of payments made in the three groups after receiving reminder notice #1. The relation between these groups was significant ( $X^2 (2, N = 396) = 8.23, p < .05$ ). In particular, significantly more debtors in intervention group 2 paid off their debts after receiving reminder notice #1 compared to debtors in the control group (46.2% vs. 29.3%,  $X^2 [1, N = 265] = 8.04, p < .05, OR = 0.48$ ). However, no significant differences were found between payments of debtors in intervention group 1 and the control group (35.9% vs. 29.3%,  $X^2 [1, N = 264] =$



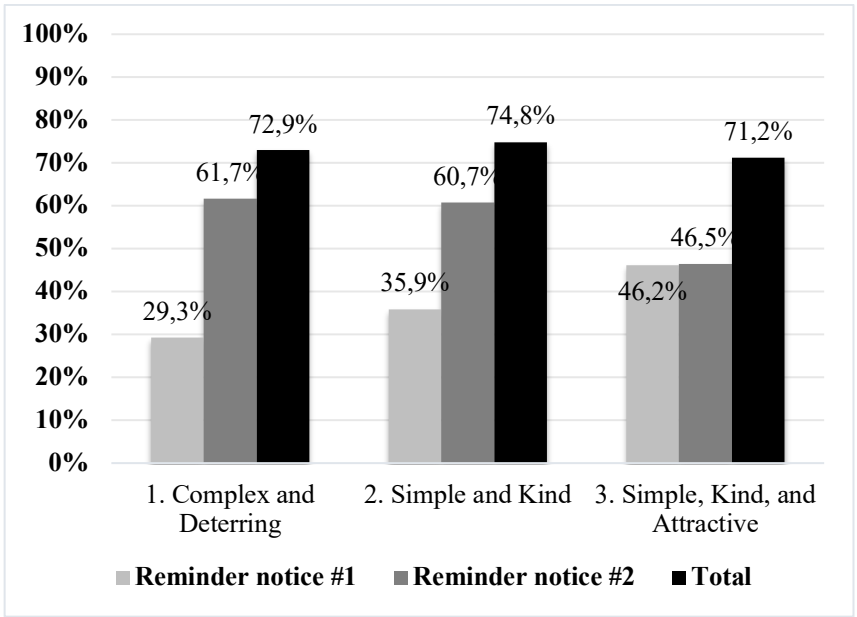
1.29,  $p > .05$ , OR = 0.74). Hence, the results provide mixed support for hypothesis 1. After receiving reminder notice #1, voluntary debt payments were higher in the two intervention groups when compared to the control group, but these differences only reached statistical significance between the control group and intervention group 2.

To test hypothesis 2, a chi-square test of independence was performed to examine the relation of payments made in the two intervention groups after receiving reminder notice #1. No significant differences were found between payments of debtors in intervention group 2 and intervention group 1 (46.2% vs. 35.9%,  $X^2 [1, N = 263] = 2.90, p > .05$ , OR = 0.65). Hence, this result did not support hypothesis 2. After receiving reminder notice #1, voluntary debt payments were higher in intervention group 2 than in intervention group 1, but this difference was not statistically significant.

To test hypothesis 3, we turn to the results from those debtors who did not pay off their debts after receiving reminder notice #1 and who received a reminder notice #2. Here, 249 copies of reminder notice #2 were sent out, and 142 debtors (56.3%) paid off their debts after receiving it. A chi-square test of independence was performed to examine the relation of payments made in the three groups after receiving this reminder notice. The relation between these groups was not significant ( $X^2 [2, N = 249] = 4.53, p > .05$ ). Hence, the results support hypothesis 3. Among debtors who received a second reminder notice (i.e., debtors who did not pay after receiving the first reminder notice), voluntary payments did not differ significantly across the groups.

To test hypothesis 4, we turn to the combined results from debtors who only received reminder notice #1 and debtors who received both reminders. Here, 289 debtors (73.0%) paid off their debts. A chi-square test of independence was performed to examine the relation of payments made in the three groups at measurement time 2. The relation between these groups was not significant ( $X^2 [2, N = 396] = 0.43, p > .05$ ). Hence, this result does not support hypothesis 4. Among all debtors, and after 2 months, voluntary payments did not differ significantly across the groups.

Figure 2. Proportion of debtors who paid off their debts by groups and reminders.



## Discussion

In study 1 we find supportive evidence of nudging contributing as a cost-free tool for collecting public debt. The first nudging reminder notice sent to intervention group 2, which used simple, kind, and attractive communication features, elicited significantly larger voluntary payments than the standard reminder notice, which used a complex and threatening communicative style. This result suggests that many debtors do not initially pay off their debts because they procrastinate, not because they are economically constrained or intentionally trading off economic benefits for economic costs.

Given that the reminder notice sent to intervention group 2 contained several nudges, it is difficult to determine which particular nudges were the most effective. However, a comparison of payments made in the two intervention groups shows that the baby picture in itself increased payments by 27.8% (a nonsignificant difference, however, cf. hypothesis 2), and hence this nudge seems to be particularly effective. The result did show differences between payment rates in the control group and intervention group 1 (29.3% vs. 35.9%), but these differences did not reach statistical significance. This suggests that simplification and kindness nudges alone may be insufficient to increase debt payments, but the result may also be caused by lack of statistical power.

As hypothesised, we saw no significant payment differences across groups among debtors receiving a second reminder. As argued, this result may be attributed to a decreased proportion of procrastinators in the groups receiving nudged reminders. In short, since more procrastinators paid off their debts after receiving reminder notice #1, fewer procrastinators received a second reminder notice, leaving the nudge interventions less effective on the remaining debtors.

This finding is in line with other studies showing that nudge interventions are most effective on individuals who are on the margin of the particular behaviour (see, e.g. Dellavigna, List, Malmédier & Rao, 2013).

The lack of total payment differences across the groups at measurement time 2 was unexpected. Evidently, the initial positive effect of nudged reminder notices on voluntary debt payments is offset by sending out additional reminder notices. This suggests that nudging may only speed up public debt collection by getting more procrastinators to pay off their debts quickly. Thus, the final cost-effectiveness of nudging reminder notices is ultimately determined by the costs associated with sending additional reminder notices relative to the benefits associated with payment of additional late fees.

In sum, the result obtained from study 1 suggests that a behavioural approach to tax compliance and debt collection may be superior to an economic deterrence approach in some contexts, and that public communication that utilises this insight may be more effective in gaining compliance. However, given that the reminder notices sent to the intervention groups included a reference to the economic consequences of continued nonpayment, albeit very subtle and much less expressive as in the standard reminder notice, it is possible that payment-nudging might only be effective in tandem with threats of economic sanctions. Alternatively, given previous findings regarding crowding out effects, it is also possible that economic deterrence might crowd out intrinsic motivations for paying in all the groups.

## Study 2

### Design, variables, and procedure

Study 2 addressed some questions and shortcomings of study 1. First, the sample in study 1 included debtors who had not paid for public day care services. Hence, the sample included a mix of debtors who procrastinated, debtors who were unwilling to pay, and debtors who were unable to pay off their debts. Given that nudging is arguably more effective on procrastinators rather than cheaters and liquidity-constrained debtors (Hallsworth, 2014), in study 2 we focused on a sample of debtors who were predominantly procrastinators—namely, citizens who pay their bills for public services, but who also pay late, i.e. late payers rather than nonpayers. Here, Aarhus municipality let us test this with all citizens in the municipality who had small debts ( $M = \$62$ , range =  $\$7.5$ – $\$558$ ) from added fees and interest because previous payments for public day care services had been late. Here, the sample totalled 549 debtors (478 women, aged 22–66,  $M = 38.3$ ), a sample size that, as in study 1, left us with the same option to constrain the number of intervention conditions, and to pool multiple nudges in to each intervention group. As in study 1, all debtors were randomly allocated to three conditions. A control group ( $N = 185$ ) received a standard reminder notice, whereas intervention group 1 ( $N = 185$ ) and intervention group 2 ( $N = 179$ ) received new nudged notices. In study 2, we also addressed the possible confounding factor of economic deterrence in study 1. Hence, neither of the reminder notices in study 2 included references to economic sanctions. Finally, given that most citizens now receive their mail from authorities digitally, in this study we tested whether the results from study 1 could be reproduced in a

sample that received their notices digitally. The notices were sent digitally<sup>1</sup> to the target group on September 6 2016. For this type of debt claim, procedures do not include second reminder notices, so in this study, we measured only effects after the payment deadline of receiving reminder notice #1.

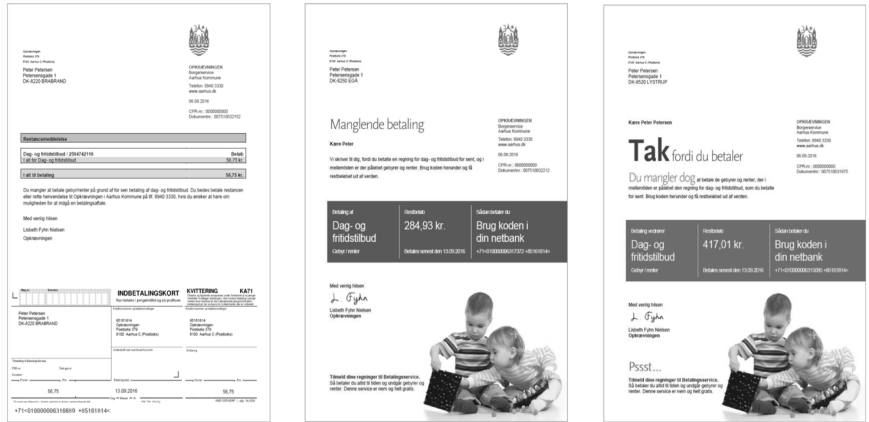
**Reminder Notice Sent to Control Group: Complex and Neutral.** The reminder notice sent to the control group shared several features with the reminder notice sent to the control group in study 1; it used somewhat complex language, and it included a salient debt specification and payment slip (see Figure A4 in appendix). This notice did, however, only contain one page, and it included a headline stating: “Arrears message”. Also, in contrast to the notice sent to the control group in study 1, the notice sent to this control group did not include threats of future economic fines in case of continued nonpayment.

**Reminder Notice Sent to Intervention Group 1: Simple, Kind, and Attractive.** As in study 1, the reminder notice sent to intervention group 1 was simplified (see Figure A5 in appendix). The language was simpler, and key information was highlighted with a salient grey textbox (debt owed and information on how to easily pay the amount due). The headline was changed to a more clarifying message: “Missing payment”, and it was made more salient. In addition, the notice used a kind and personal tone. Finally, to make the notice more attractive, we included a large picture of two small children playing in the bottom-right corner.

**Reminder Notice Sent to Intervention Group 2: Simple, Kind, Attractive, and Grateful.** The reminder notice sent to intervention group 2 was similar to the notice sent to intervention group 1: it was simplified, and it included kind addressing and the same picture of two children playing (see Figure A6 in appendix). The reminder notice differed in two ways. First, the highlighted textbox was now green. Second, the headline was replaced with “Thank you for paying”, with the “Thank you” written in large bold font. This nudge aimed at inducing reciprocal tendencies in recipients (Cialdini, 2006).

The nudging reminder notices sent to intervention groups 1 and 2 were pretested (along with other notice prototypes) in a small focus group interview with three participants and in a survey with 209 participants. The feedback was generally positive. Notably, participants reacted favorably toward the personalised information, and many participants mentioned that the headline and the highlighted textbox caught their attention. Some participants, however, also indicated that the reminder notice sent to intervention group 2 might be too kind. For instance, one participant stated: “I think that the Municipality of Aarhus might be a bit too kind to the recipient. I understand why they try to address the issue this way, but for me, it seems like they are down on their knees begging.”

Figure 3. Reminder notices sent to the three groups in study 2.



From the left: control group, intervention group 1, intervention group 2.

**Hypothesis 1.** We hypothesised that both of the new nudged reminder notices would encourage more debtors to pay off their debts as compared to the standard reminder notice. Hence, we hypothesised that the proportion of paying debtors would be higher in intervention group 1 and intervention group 2 when compared to the control group.

**Hypothesis 2.** We also hypothesised that the grateful reminder notice would encourage more debtors to pay off their debts. Hence, we hypothesised that the proportion of paying debtors would be higher in intervention group 2 than in intervention group 1.

Table 1. Overview of the different reminder notices' central features in study 1 and study 2.

	Study 1			Study 2		
	Control	Nudge 1	Nudge 2	Control	Nudge 1	Nudge 2
<b>Condition</b>	Control	Nudge 1	Nudge 2	Control	Nudge 1	Nudge 2
<b>Info.</b>	None	Green	Green	None	Grey	Green
<b>highlight</b>		textbox	textbox		textbox	textbox
<b>Language</b>	Complex	Simple	Simple	Neutral	Simple	Simple
<b>Tone</b>	Deterring	Kind	Kind	Neutral	Kind	Kind
<b>Payment slip</b>	Page 1	Page 2	Page 2	Page 1	None	None
<b>Picture</b>	None	None	Baby	None	Two children	Two children
<b>Headline</b>	None	None	None	Arrears message	Missing Payment	Thanks for paying

## Results

After receiving their reminder notices, 126 (23.0%) citizens paid off their debts. To test hypothesis 1, a chi-square test of independence was performed to examine the relation of payments made in the three groups. The relation between these groups was significant ( $X^2 [2, N = 549] = 7.20, p < .05$ ). Significantly more debtors in intervention group 1 paid off their debts compared to debtors in the control group (25.9% vs. 16.2%,  $X^2 [1, N = 370] = 5.26, p < .05, OR = 0.55$ ), and significantly more debtors in intervention group 2 paid off their debts compared to debtors in the control group (26.8% vs. 16.2%,  $X^2 [1, N = 364] = 6.07, p < .05, OR = 0.53$ ). Hence, the results supported hypothesis 1: voluntary debt payments were significantly higher in the two intervention groups when compared to the control group.

To test hypothesis 2, a chi-square test of independence was performed to examine the relation of payments made in the two intervention groups. No significant differences were found between payments of debtors in intervention group 1 and intervention group 2 (25.9% vs. 26.8%,  $X^2 [1, N = 364] = 0.04, p > .05, OR = 1.05$ ). Hence, the results did not support hypothesis 2.

On a more qualitative note, throughout the test period several debtors called the switchboard at the Municipality of Aarhus. From this feedback, we learned that the personalised-sender nudge seemed to have a positive effect, as many debtors asked to speak directly with the specific caseworker who had signed the notice. More generally, debtors expressed both positive and negative views on the nudged reminder notices. Some found the new reminder notices great and easy to comprehend, whereas others found them condescending.

## Discussion

The result from study 2 replicated the findings from study 1: nudged reminder notices with a combination of simplification nudges, a kind tone, and an attractive and relevant picture included, elicited significantly higher voluntary debt payments compared to the standard reminder notice (cf., hypothesis 1). This result suggests that the results found in study 1 were not confounded by economic deterrence and that the positive effect of using nudging for debt collection is not dependent on additional economic deterrence. Second, the result showed that nudging public letters work equally well in digital mail as in classic physical mail. This is important, as all communication from Danish authorities is now digital. The result did not, however, show significant differences in payment rates between intervention group 1 and intervention group 2 (cf., hypothesis 2), suggesting that a grateful tone does not in itself affect payment.

## General discussion

In the present studies, we tested the effectiveness of using different nudges as cost-free tools in public debt collection. In particular, we tested the effects of making reminder notices simpler, kinder, and more attractive. Results from two natural field experiments conducted in cooperation with the local Aarhus government showed that nudging techniques increased public debt collection significantly. In study 1, the most effective notice increased public debt collection by 57.6% compared with the control notice, and in study 2, the most

effective notice increased debt collection by 65.4%. Given that these techniques are practically cost-free, easy to implement, and that they do not constrain debtors' options, these positive effects are substantial, and also larger than in previous studies of nudging in public debt collection.

These studies show that the core assumptions of the economic deterrence model—that individuals do not pay their debts because they are liquidity constrained or because they intentionally trade-off the costs and benefits of paying (that is, they cheat intentionally)—are insufficient. Debtors in both of our studies were particularly responsive to reminder notices that were simple, kind, and attractive, psychological factors that the economic deterrence model consider irrelevant for costly economic compliance. The results are suitably explained by the behavioural approach. Here, core barriers to debt payment also include debtors' lack of attention and tendency to procrastinate. This is why seemingly irrelevant, soft factors—such as simplification, kindness, and attractiveness—are effective. Simplification techniques (e.g., simple language, highlighting key information, removing irrelevant information) eases information processing and directs attention to the important aspects of the message, thus decreasing chances of confusion and procrastination (Service et al., 2014). Utilising kind language may buffer against aversive affects experienced in response to the prospect of losing money, or it may stimulate favorable reciprocal tendencies (Cialdini, 2006). Finally, displaying attractive pictures increase attention and may stimulate positive emotions, which in turn may facilitate compliance (Cialdini, 2006). With the addition of a relevant picture of a baby pointing to key call to action information in study 1, we extend previous nudging efforts within public debt collection, by showing that deep biologically rooted information processing tendencies may be harnessed in public communication efforts (i.e. automatic tendency to allocate high visual attention to babies, especially by mothers, and automatic tendency to allocate high visual attention to others' gaze).

The general implications point to benefits of incorporating insights from the behavioural approach to public management. In particular, the studies show that public authorities may gain more behavioural compliance by communicating in a clear and forthcoming manner. Being a kind and being an effective government does not necessarily need to be an oxymoron. The key is to understand core psychological barriers to appropriate behaviour and to harness specific attention-grasping and persuasive techniques to reduce these barriers. With debt payment, core barriers include procrastination and lack of attendance to public messages, and easy-to-process information and attractive pictures may be utilised to reduce these barriers. The behavioural approach thus includes a more empathic service design thinking, where public authorities may benefit from investing efforts to understand the individual and situational barriers to problematic citizen behaviour. In particular, it may be beneficial to understand the problem from the citizens' perspectives using techniques like usability studies and user journey maps.

These behaviourally informed focus areas need not overrule economic deterrence. On the contrary, punitive and persuasive methods may fit hand in glove to gain compliance from different types of people (Devos, 2014; Hallsworth, 2014). Nudged reminder notices may, for instance, be particularly

effective on procrastination-prone debtors rather than on cheaters and liquidity-constrained debtors (Fellner, Stausguber, & Traxler, 2013; Hallsworth, 2014). The results reported here adds tentative support for this hypothesis. When comparing total payment results from measurement time 1 and 2 in study 1, the preliminary positive effects of nudging was offset over time. Also, verbal feedback from several debtors suggested there might be important individual differences in the response to the nudged reminder notices. Future documented effects of individual differences may pave the way for increasing attention toward communication customisation based on citizen segmentation (Hallsworth, 2014). With regard to debt collection, it may be advantageous to address occasional late payers with kind and personalised communication, while addressing payers with a long history of debt noncompliance with a more traditional authoritarian deterrence style. This raises several issues, one being ethical, as this, in essence, is discrimination. Another issue is technical, as automated user segmentations demands flexibility in IT systems.

The studies presented here raise additional questions that warrant attention in future studies. Given that both experimental groups in both studies received multiple nudges, one limitation of the studies is the inability to pinpoint which nudges are the most effective. As each nudge in itself is often a very subtle change in context that arguably may only cause small incremental changes in outcomes, putting multiple nudges in an intervention group is a typical response to access limited sample sizes, as was the case for the present studies. Nonetheless, it is important for future studies to measure the isolated effects of single nudges, as small nudges may have large effects. In study 1, for instance, adding an attractive picture to an already nudged reminder notice increased debt payment substantially. Similarly, measuring single nudge effects will enable studies to rule out potential nudge interactions within experimental groups.

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## Notes

<sup>1</sup> Thirty-three out of the 549 debtors (6.0%) did, however, receive their notices in classic physical mail, as these debtors had not signed up for electronic mail.