# SHAMING FOR TAX ENFORCEMENT: EVIDENCE FROM A NEW POLICY

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**Abstract**

Can public shaming increase tax compliance through social pressure? Many tax authorities make ample use of public shaming. However, empirical evidence from outside the laboratory on how a new shaming law affects overall compliance is lacking. We provide the first evidence from the field, exploiting comprehensive administrative tax data and the introduction of a novel naming-and-shaming policy in Slovenia in 2012. The policy aims to reduce outstanding tax debt among the self-employed and corporations. Our empirical strategy exploits the variation across taxpayers in ex ante exposure to the shaming policy. We find that taxpayers reduce their tax debt by 8.5% to avoid shaming, particularly in industries where reputational concerns are likely to be important. The publication of the first naming-and-shaming list further reduces tax debt among shamed taxpayers because of social learning. This effect, however, is marginal in terms of revenue and tapers off quickly.

**Keywords** compliance · tax debt · shaming · enforcement · social image concerns · penalty

**JEL Classification** H26 · D1 · K34 · K42 · Z13

## 1. Introduction

Is the public spotlight an effective measure to achieve policy goals? This question is at the heart of an ongoing debate in the tax compliance literature that asks whether there is a role for social incentives (e.g., Slemrod 2007; Luttmer and Singhal 2014). If social incentives influence taxpayers' tax compliance decisions, it might be attractive for tax authorities to revert to an instrument that has historically been widely used in societies in other contexts: public shaming.

Conceptually, the effect of public shaming on tax revenue is ambiguous. On the one hand, the literature on social pressure (surveyed in Bursztyn and Jensen 2017) highlights that behavior is significantly influenced by concerns about social image.[1] Increasing the observability of non-compliance may thus prevent taxpayers from engaging in it. On the other hand, shaming can backfire if it informs taxpayers that others are non-compliant (Gino and Ariely 2009; Blaufus et al. 2017) or crowds out a taxpayer's intrinsic motivation (Bénabou and Tirole 2003; Boyer et al. 2016). Despite the fact that the effect of public shaming on tax revenue is conceptually ambiguous, many tax authorities make ample use of public shaming as a penalty for non-compliance. One half of tax administrations in the OECD have the power to publish the names of tax delinquents and nearly 90% thereof frequently or infrequently used this power in 2015 (OECD 2017, p.109 et seq.).[2] Yet, we know surprisingly little about how the introduction of shaming impacts overall compliance. Our study is the first to present rigorous evidence from the field on whether and how the introduction of public shaming affects compliance behavior.[3]

We study a new policy that shames taxpayers with outstanding tax debt on the Internet. While taxes for wage earners are collected by way of withholding, the income and value added of the self-employed and of corporations are taxed in a self-assessment regime. The self-assessment regime opens up the possibility to accumulate significant tax debt for the self-employed and for corporations (and their beneficial owners). Both are the focus of this study. Specifically, we analyze the introduction of the public shaming of tax

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[1]The theoretical literature on the origins of social image concerns include, among others, signaling motives (Spence 1973) and social norms (Bénabou and Tirole 2011). In our context, both motives may be important. Taxpayers may avoid sending unfavorable signals on financial health towards banks and business partners and may wish to comply with a social norm.

[2]This makes shaming the fourth most used instrument of tax debt enforcement (OECD 2017). Figure A.1 provides an overview of its worldwide use for tax collection. The popularity of shaming is not limited to tax compliance. There are numerous examples from different areas of policy, including the naming-and-shaming of water wasters (South Africa), sex offenders (United States), and speeding drivers (Australia) (see, for instance, Pawson 2002). Related are transparency policies that reveal the behavior of every entity involved. Transparency policies include public health initiatives where each restaurant has to display its most recent rating of the government hygiene inspection. Fung et al. (2007) discuss the advantages and disadvantages of transparency policies.

[3]Indeed, to our knowledge, the only evidence from the field comes from an experiment in which an existing shaming policy was made more salient (Perez-Truglia and Troiano 2015). A couple of studies have introduced shaming incentives in the laboratory. Coricelli et al. (2010) study the impact of shaming on compliance. They find that both the number of evaders and the amount of tax evaded reduce significantly if a picture of detected evaders is displayed to all group members. In a public goods experiment, Jacquet et al. (2012) demonstrate that the threat of shaming (being publicly exposed as one of the two least generous group participants) increases cooperation. Another set of laboratory experiments find that revealing the identity of participants affects cooperation in public goods games (e.g. Gächter and Fehr 1999; Andreoni and Petrie 2004; Rege and Telle 2004).

delinquents in Slovenia in 2012. Four features of this setting are crucial to our empirical analysis. First, shaming is a new action and thus sharply increases social incentives. Second, the Slovenian shaming list is published on the Internet and has received wide media attention. Hence, shaming is highly visible. Third, the Slovenian tax administration shames taxpayers with outstanding tax debt. As we have access to the administrative payment data and to the records of outstanding tax debt, we can perfectly observe any behavioral response to the shaming incentive. Fourth, the shaming policy was announced four months before its implementation. The delayed implementation allows us to separate behavioral responses to the *threat of shaming* (after the adoption of the law but before the implementation of the policy) from behavioral responses to *actual shaming* (after the publication of the first shaming list).

Compliance involves three issues: accurate reporting, timely filing, and timely paying (Slemrod et al. 2001). We focus on tax payments. Enforcing tax payments is an important cornerstone of tax collection and OECD (2017) identifies tax debt as a key area for further consideration.[4] Many developed economies face difficulties in ensuring the (timely) payment of undisputed tax debts. In 2011, the average OECD country missed out on tax revenue equal to 11% of the annual tax revenue collection because of undisputed but unpaid tax debt (OECD 2013). In Slovenia, total tax debt overdue equaled €1.9 billion, or 5.1% of GDP in 2011. To tackle this issue, the Slovenian government adopted a shaming law in 2012.

The Slovenian shaming policy was introduced simultaneously for all individuals and legal entities. Since then, the tax administration has named-and-shamed taxpayers with tax debt over €5,000 that is more than 90 days overdue ("delinquent taxpayers"). Detailed information on delinquent taxpayers is published monthly on the Internet. The published information includes name, address, and tax identification number as well as the name and address of beneficial owners (for legal entities only). The published information unambiguously identifies taxpayers. Thus, social pressure and social image concerns may be at play, both when the self-employed and when (the beneficial owners of) corporations respond to the shaming policy.

The main part of the study focuses on the effect of the threat of shaming on tax payment behavior. Although the shaming law was fully applicable to all taxpayers, taxpayers were heterogeneously affected. We exploit the fact that taxpayers had different debt histories before the shaming law to identify the effect of the shaming threat. Think of taxpayers who seldom incurred tax debt as they predominantly paid new tax items on time. They hardly have to change behavior to avoid shaming. Now contrast these taxpayers to taxpayers that had tax debt on many occasions. They can only avoid shaming if they significantly adjust their payment habits. To identify the threat of shaming, we thus exploit the variation in ex ante exposure to the policy. The empirical strategy is to compare changes in tax debt among taxpayers with high exposure

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[4]Recent studies of tax payments include Hallsworth et al. (2017), who show that the late payment of taxes in the United Kingdom falls in response to letters that emphasize social norms and the ways in which tax revenue finances public goods.

to the shaming law with those among taxpayers with low exposure.[5] Exposure is measured by the share of days on which a taxpayer would have been shamed on a hypothetical shaming list before the introduction of the shaming law ("shaming probability"). Ex ante individual shaming probabilities are, of course, not randomly assigned. A causal effect can be identified when the following two assumptions hold. First, in the absence of the shaming law, any baseline differences would have continued on the same trend. Second, there should be no selection into treatment. We provide supportive evidence for the plausibility of both assumptions. The shaming law also has an expressive value (Sunstein 1996; Kahan 1997; Posner 1998, 2000, 2002; Bénabou and Tirole 2011). That is, by passing the shaming law, the government sends a signal to all taxpayers that having tax debt violates a social norm and will be punished. Since our identification approach does not capture any effect of the shaming law on all taxpayers, our estimates provide a lower bound of the full impact of the threat of shaming.

Following the analysis of the threat of shaming, we focus on actual shaming. Actual shaming is unlikely to be an effective tool for reducing tax debt if taxpayers form correct expectations about the social costs of shaming. If the social costs are larger than anticipated, actual shaming may lead some of the first unwilling tax delinquents to engage in social learning and to pay their tax debt.[6] Social learning may happen if there are fewer tax delinquents shamed (signaling a stronger social norm) or if naming-and-shaming entails graver social costs (such as broader media coverage or greatly impaired reputation with customers) among shamed tax delinquents. Importantly, only the tax debts of shamed taxpayers become public information, while the tax debts of non-shamed taxpayers remain private information under the shaming law. This implies that non-shamed taxpayers can learn from observing shamed taxpayers (but not the other way around). To gauge the impact of actual shaming, we relate the extent of social learning within a certain region and industry sector to individual changes in tax debt among shamed tax delinquents. We measure social learning among non-shamed taxpayers to avoid endogeneity. Our approach yields a causal effect if the common trend assumption holds. In our context, this states that the change in the tax debts of shamed delinquents would have been the same in industries with little and with significant social learning in the absence of the shaming law. Implicitly, this requires the pre-period differences in the inflow of new tax items to continue on the same trends. Indeed, we show that new tax items smoothly evolve for industries with little and with significant social learning in our observation period.

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[5]Comparable difference-in-differences approaches have been used in other contexts by e.g., Rajan and Zingales (1998), Finkelstein (2007), Mian and Sufi (2012), and Fort (2017).

[6]Expectation interactions through observational learning may cause social externalities of incurring tax debt (Manski 2000). A natural question is whether social learning can be leveraged for policy (BenYishay and Mobarak forthcoming), particularly for fostering tax compliance (DelCarpio 2014).

While some individuals may be unwilling to respond to the shaming law, others are unable to do so as they are financially constrained. Actual shaming is unlikely to be an effective tool for reducing tax debt among financially constrained taxpayers. On the contrary, naming-and-shaming may signal reduced financial strength and make financial constraints (weakly) more binding. A shaming law may thus entail significant welfare losses when financial constraints are important.

Our main empirical findings are as follows. First, corporations and the self-employed significantly reduce their tax debts to avoid shaming. To avoid shaming, corporations reduce their tax debt by 8.5% on average. This corresponds to €54 million of extra tax revenue (or 9% of annual CIT revenue). The self-employed reduced their tax debt by 4.5%, which is equal to extra tax revenue of €3.8 million. In the paper we argue that these amounts are indeed additionally collected (and not just brought forward). Hence, the threat of shaming is effective at increasing compliance and at enforcing tax payments which were considered uncollectable with standard enforcement instruments. This suggests that social pressure and social image concerns are important determinants of tax compliance.

Second, the response to the threat of shaming is strongly heterogeneous in the population. The social costs of shaming are larger in industries with high reputational concerns (selling to end customers), in non-exporting industries that heavily depend on the domestic market, for micro corporations in which responsibilities are less distributed, and for large corporations that are more in the public eye. We find that these corporations respond most to the policy. Potentially, the shaming policy thus entails significant distributional consequences.

Third, actual shaming further reduces tax debt among shamed corporations. The publication of the first shaming list lowers corporations' tax debts by another 3.2%. However, this effect is short-lived and restricted to the first shaming list. The fluctuation on the shaming list is low: 96% of the tax delinquents shamed on the second shaming list already featured on the first list. We estimate that actual shaming lead to a one-time increase of tax revenues among corporations of €2.1 million. Compared with the additional tax revenue that was collected in response to the shaming threat, the revenue effects from actual shaming are thus very modest. Hence, tax administration need to carefully design the threshold amounts of the shaming policy and in particular need to allow for a period of threat.

Fourth, the shaming law has small and mostly insignificant effects for taxpayers with zero shaming probability. Corporations and self-employed individuals that paid their tax debt on time prior to the shaming law continue to do so after the implementation of the law. That is, contagion effects are absent. This finding is consistent with either little new information conveyed by the shaming list or the presence of a "duty to comply" (Dwenger et al. 2016).

Taken together, the shaming law triggers a large response to the threat of shaming but a negligible response to actual shaming. The response to the threat of shaming implies that taxpayers have been aware

of the social norm of paying taxes on time but failed to comply. Hence, the shaming law successfully increases compliance with an existing social norm but is unsuccessful in radically changing the social norm.

This is the first study to provide causal estimates of how the introduction of public shaming affects compliance behavior. It contributes to the literature on the tax compliance of individuals (surveyed by Andreoni et al. 1998; Slemrod and Yitzhaki 2002; Slemrod and Weber 2012) and firms (Kopczuk and Slemrod 2006; Gordon and Li 2009; Pomeranz 2015; Bérgolo et al. 2017; Almunia and Lopez-Rodriguez 2018). Specifically, the study advances the emerging literature on non-pecuniary motivations for compliance (Luttmer and Singhal 2014). Despite the large amount of work on tax compliance and the ample use of shaming by tax authorities, there is no field evidence on how the introduction of a shaming policy affects compliance. The study most closely related to ours is Perez-Truglia and Troiano (2015). In a randomized field experiment, they study how the salience of an existing policy of shaming tax debtors affects compliance. Particularly, they investigate the mechanisms through which actual shaming may affect tax compliance: social pressure and peer comparisons. Raising the visibility of tax debtors among neighbors increases the probability of leaving the list by individuals who have debts below $2,500, but has no effect on individuals with larger debt amounts.[7] Providing information on tax debt amounts of peers leaves individual payment behavior unaffected. Overall, these findings suggest that social pressure is important while peer comparisons are not. Perez-Truglia and Troiano exclusively focus on shamed tax debtors because they do not have access to administrative data and increase the salience of an existing policy. Thus, they cannot speak to whether introducing a new shaming policy increases overall tax revenue: any increase in tax revenue from tax debtors may be offset by a revenue loss among previously compliant taxpayers who learn from the shaming policy that others have been non-compliant. Our setting allows us to separately describe the effects of actual shaming on shamed and non-shamed taxpayers as well as to distinguish between the threat of shaming and actual shaming. Also, the change in social incentives that the experiment by Perez-Truglia and Troiano induces is likely to be small. It therefore remains an open question whether social incentives such as shaming scale up well or whether the incentives are too small. We study the introduction of a new shaming policy that sharply affects social incentives for taxpayers with small and large tax debt amounts. Our empirical results reveal significant behavioral responses to the shaming policy among taxpayers of different tax debts amounts, in particular to the threat of shaming.

In a different context, Dyreng and Wilde (2016) provide evidence that public pressure has real consequences. By exploiting a shock to the public scrutiny of firm subsidiary locations, they show that public

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[7]Visibility of tax debtors was raised by sending a letter that referred to the public records from the tax departments and featured 10 individual tax debtors and their tax debt amounts. The effect is estimated by comparing a high and a low visibility treatment. In the high visibility treatment, households were informed that their household "and other households in your area were randomly chosen." In the low visibility treatment, households were informed that the "household was the only household randomly chosen from your area to receive a letter of this type."

scrutiny increases the number of subsidiary location disclosures and, in particular, firms' effective tax rates. They further describe disproportionately higher levels of tax haven usage for previously non-disclosed subsidiary locations and conclude that public scrutiny leads to a decrease in tax avoidance.

Other studies related to ours analyze the impact of public disclosure on compliance.[8] In Norway, information on income, wealth, and income and wealth taxes paid has been available on the Internet since 2001. Before 2001, members of some sports and leisure clubs went from door-to-door to sell printed copies of the entire tax transcript of that area to finance club activities. This implies that tax information was already easily accessible in some local areas before 2001. Bø et al. (2015) exploit the variation in accessibility over time and across space to identify how public disclosure impacts reported income. They find that business owners significantly increase reported income when tax information is made available on the Internet. The effect is larger in reputation-based industries and in less densely populated areas. Exploiting the same setting, Perez-Truglia (2016) underlines that public disclosure not only affects tax revenue but has also direct consequences for subjective well-being. Public disclosure increases income transparency, and through concerns about relative standing increases the well-being of high income individuals and reduces that of low income individuals. The study by Hasegawa et al. (2013) draws our attention to other potential costs of public disclosure. They find that when there is a threshold for disclosure, a significant number of individual and corporate taxpayers underreport taxable income to avoid disclosure.

Our study is more broadly related to the literature on social pressure. A number of recent studies have emphasized the importance of social pressure as an important determinant of behavior in various areas such as voting, education, and financial choices (survey in Bursztyn and Jensen 2017). Social pressure arises as society agrees on what is desirable. Do governments have the capacity to influence what is considered desirable? Besley et al. (2014) study the persistence of social norms in explaining tax evasion. They exploit the introduction of the "poll tax" in the United Kingdom in 1990, which was perceived as highly unfair (and was abolished in 1993). Their results suggest that the poll tax shifted tax compliance norms. We find that changing the observability of behavior by shaming affects compliance. Governments thus indeed shape social pressure through their legal actions. However, we also highlight the potential negative welfare consequences of increasing social pressure, particularly for financially constrained taxpayers.

The remainder of this paper is structured as follows. Section 2 provides an overview of the institutional details and introduces our data set. Section 3 explains our empirical strategy. In section 4, we present our empirical results. Section 5 discusses the welfare implications of the policy and section 6 concludes.

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[8]For a discussion of the potential advantages and disadvantages of tax disclosure, see Lenter et al. (2003).

## 2. Institutions and Data

### 2.1. Institutional Background

The Slovenian tax system comprises direct taxes on income, direct taxes on property, and indirect taxes (Schellekens et al. 2017). During our observation period, all taxes and social security contributions were collected by the tax administration of Slovenia.[9] While personal income taxes are collected by withholding during the year, corporate income and value added are taxed in a self-assessment regime.[10] In addition, self-employed individuals and corporations are obliged to remit social security contributions.[11] The self-assessment regime for the self-employed and for corporations opens up the possibility to accumulate significant tax debt, which is the focus of our study.

Unlike employed individuals, corporations and the self-employed are not subject to withholding and can easily defer the payment of their tax bills. Corporations account for 80% of tax debt and the self-employed 7.5%.[12] In our analysis, we focus on these taxpayers to study whether naming-and-shaming can affect their tax debts.

The Slovenian tax administration sends out a payment reminder for each tax issue one week after the payment deadline has passed. Thus, inattention or uncertainty about how much to pay cannot explain the high tax debt levels. Instead, the tax administration deplores a "lack of payment discipline" (Republic of Slovenia, Ministry of Finance 2011). All the available instruments of tax debt enforcement have turned out to be ineffective. For instance, as Slovenia is a small country, taxpayers have opened a bank account in Austria or Italy (which are also part of the Eurozone) to escape income garnishment.[13] To recover tax debts that otherwise were uncollectable, the Slovenian parliament passed a shaming law in November 2012. This law allows the tax administration to name-and-shame taxpayers with tax debt over €5,000 that is overdue for more than 90 days ("old tax debt"). We refer to these taxpayers as "delinquent taxpayers."

To determine delinquent taxpayers, tax authorities assess total old tax debt on the 25th of each month. In the following month (between the 10th and 15th), the tax administration then publishes the names, addresses and tax identification numbers of all delinquent taxpayers on its website.[14] The published information on

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[9]On August 1, 2014, the tax administration and customs administration merged to create the financial administration that has since collected all taxes and duties.

[10]Payments for corporate income tax and value added tax must be made in advance on a quarterly or monthly basis (depending on the size of the business). Other than that, the payment deadline is 30 days after the tax assessment. Various penalties are imposed for not correctly filing a required tax return (again depending on size).

[11]Unpaid social security contributions are considered to be tax debt. Thus, in the following, "tax debt" also refers to unpaid social security contributions.

[12]Remaining tax debt among employed individuals can be attributed to single events such as inheritance or acquisition of property.

[13]Some countries can withhold government payments to a delinquent taxpayer, deny access to certain government services, temporarily close a business or withdraw a license, and impose liability on company directors for certain company tax debts (OECD 2017, Tables A.125 and A.126). These instruments are uncommon in Slovenia.

[14]http://seznami.gov.si/DURS/main_neplacniki_po_abc.html, accessed on June 13, 2018. Screenshots of the website are included in the Appendix. Please see Figure A.2 (in Slovenian) and Figure A.3 (translated into English).

corporations also includes the names and addresses of beneficial owners who directly or indirectly own shares or stocks that represent more than 25% of a corporation's share capital. The published information unambiguously identifies taxpayers. Thus, social pressure and social image concerns may be at play when both the self-employed and (the beneficial owners of) corporations respond to the shaming policy. The shaming list does not display individual tax debts but arranges taxpayers into tax debt amount categories.[15] The published information is not updated between months. That is, delinquent taxpayers are shamed for one full month (or longer). The shaming list is published as an unarchived image (which remains unscanned by search engines) and it is forbidden by law to generate a database from the published shaming lists. As a consequence, taxpayers can retreat from the public eye by paying their debt. The following four institutional features are central to our study.

First, shaming is a new action. Until 2012, the Slovenian tax administration only used classical debt collection measures such as interest and fines for late payments.[16] Before the first shaming list, tax collection did not involve any social incentives for taxpayers. Hence, the shaming law provides a large shift in social incentives that we can exploit in our empirical analysis. This overcomes the small incentives problem inherent in earlier studies (Luttmer and Singhal 2014): those were confined to either study changes in the salience of existing social incentives (Perez-Truglia and Troiano 2015) or set (small) social incentives by providing information on peer behavior (Slemrod et al. 2001; Fellner et al. 2013; DelCarpio 2014).[17]

Second, shaming is highly visible. The shaming law was highly controversial and hotly debated in the media. The Information Commissioner of Slovenia critically followed and contributed to the public discussion. She expressed concerns that the shaming information about tax debtors would be misused or that other institutions (such as banks) would use these data for other purposes (such as loan decisions). There was broad media coverage, and many popular TV programs extensively featured the shaming law (e.g., Odmevi, Studio ob 17-ih). For all these reasons, the public was well informed about the institutional details of the shaming list. When the first shaming list was published on the website of the tax administration on April 15, 2013, click rates skyrocketed: the tax administration recorded 874,301 clicks on that day (see Figure 1a). This figure corresponded to 42% of the Slovenian population (2013: 2.06 million). Public interest was also visible in the statistics provided by Google Trends in Figure 1b. Search requests related to the shaming list spiked drastically in the week after the first shaming list was published. Afterwards,

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[15]The categories of tax debt (in €1,000) are $(5;10]$, $(10;30]$, $(30;50]$, $(50;100]$, $(100;300]$, $(300;500]$, $(500;1,000]$, $(1,000;10,000]$, and $(10,000;20,000]$.

[16]The tax administration has continued classical debt collection measures such as interest, fines, and income garnishment. They remained unchanged with the shaming policy. The daily interest on late payments in our observation period was 0.0274%, which corresponds to an annual percentage rate of 10.52%. This is twice as much as the average interest rate that banks charged from households and corporations in that time (Bank of Slovenia 2018), making tax debt an unattractive means of financing.

[17]The small incentives problem is in line with the observation that interventions could successfully change behavior only when the stakes for taxpayers were small (Luttmer and Singhal 2014).

**Figure 1:** High Visibility of the Shaming Policy

**(a)** Website of the Tax Administration: Page Views
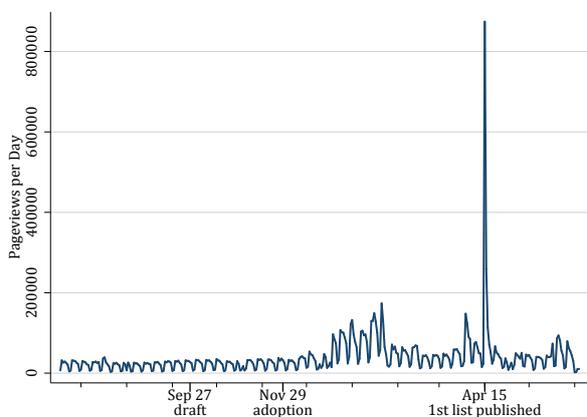
**(b)** Google Searches
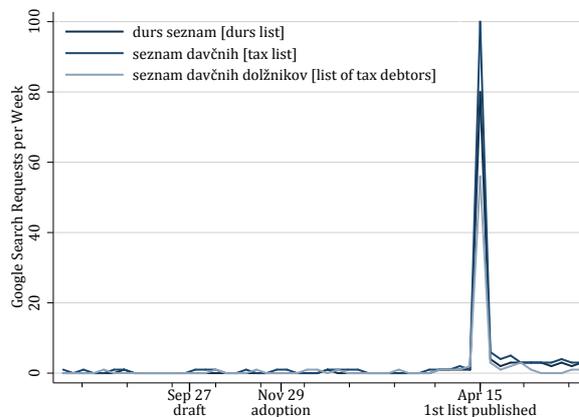


*Notes:* Figure (a) plots the number of page views of the website of the Slovenian tax administration per day. Figure (b) plots the frequency of Google searches in Slovenia for different search terms related to the shaming list as listed in the legend [English translations in brackets]. Values are reported by Google as percentages of the highest value displayed.
*Sources:* Data from the Slovenian tax administration and https://trends.google.de

the level of search requests remained slightly elevated compared with before the publication of the first list. In other words, the high public attention generated strong social incentives and taxpayers would have been fully aware of these incentives.

Third, the behavioral response shows up in the administrative data. The Slovenian tax administration shames taxpayers that have tax debt. To avoid being shamed (again), taxpayers have to pay their tax debts. In our administrative data, we observe both new tax bills and tax payments on a daily basis. That is, we can precisely measure unpaid debt and debt payment at the taxpayer level and therefore precisely estimate behavioral responses to the shaming law. All types of tax debts are treated equally, and within each tax type, the oldest tax items are cleared first. There is thus no need for taxpayers to adjust in terms of what to pay but only in how much to pay.

Fourth, the timing allows us to separate the threat of shaming from actual shaming. On November 29, 2012, the Slovenian parliament adopted the shaming law.[18] It was announced that the law would be first applied at the end of March 2013. That is, taxpayers with tax debt had about four months to pay their debt to avoid being named-and-shamed. Taxpayers that failed to do so were named-and-shamed in April 2013. The delayed implementation of the shaming law allows for behavioral responses to the threat of shaming (after the adoption but before the implementation of the law) and to actual shaming (after the first shaming list was published). The ability to distinguish between these two channels enables us to speak to what actually makes the policy work. A response to the threat of shaming implies that taxpayers have been aware of the social

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[18]The first unpublished draft of the law was initiated on September 27, 2012.

norm of paying taxes on time but failed to comply, and thus the shaming law increases compliance with an existing social norm. By contrast, a response to actual shaming suggests that the shaming law changes the social norm. In addition, it is important to distinguish between these two channels as they involve different welfare effects (Section 5).

*2.2. Data*

Our analysis links panel data from two administrative data sources: (i) daily payment records containing tax bills issued and payments made and (ii) yearly tax registry data. The tax registry contains information on the sex and age of self-employed individuals and additional characteristics for a subset of corporations such as total capital, the number of employees, and foundation year. Tax registry data are available for 2011 to 2013. The payment records from the central tax accountancy system cover July 1, 2012 to December 31, 2013. Before 2012, payment accounts were managed locally and no comparable data are available. We were granted access, however, to the preliminary payment records for the first half of 2012. These payment records have been subject to many corrections and additions (as the central tax accountancy system was not yet full-fledged at that time).[19] We therefore refrain from taking absolute tax debt levels from these preliminary data (as they are inaccurately low according to the tax administration); we merely take the earlier data to extend the time window for which we define the intensity of the treatment (see below). We exclude insolvent taxpayers as well as taxpayers with write-offs of €10 or more and limit the analysis to active taxpayers.[20] This leaves us with 58,507 self-employed individuals and 77,578 corporations.

Table 1 shows the descriptive statistics for the main variables of our data set. Panel (a) focuses on corporations and Panel (b) on the self-employed. For corporations, the variables have positively skewed distributions as one would expect in the firm data. On average, corporations have €8,133 (€2,542) of tax debt at least (less than) 90 days overdue. Having tax debt is a common phenomenon: 24% of corporations have old and 46% of corporations have young tax debt. The standard deviations (SDs) of old and young tax debts reveal substantial heterogeneity across corporations. Most important for our analysis at the taxpayer level is the within-corporation variation. The within-SD measures variability in the data over time, not across corporations. It shows substantial variation in tax debt within corporations. In total, 71% of the corporations in our data set belong to the tertiary sector, 17% belong to the secondary sector, and the remaining 12% to the primary sector. The average corporation was founded 11 years ago. Tax registry information on

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[19]The data transfer from 16 locally managed tax offices to the central tax accountancy started on October 1, 2011. During the transition process, the number of accounts significantly reduced to one per taxpayer, which triggered several corrections and additions. According to the tax administration, it took until June 30, 2012 for all the discrepancies to be resolved and a uniform recovery system to be implemented.

[20]We define taxpayers as "active" if they incurred at least one new tax item or cleared at least one tax item in 2012 or 2013 (the observation period).

**Table 1:** Descriptive Statistics

|  | Mean | Median | SD | SD within | # Taxpayers |
|---|---|---|---|---|---|
| **Panel (a): Corporations** | | | | | |
| **Tax debt** | | | | | |
| Old tax debt [in €] | 8,133.2 | 0 | 480,149 | 173,589 | 77,578 |
| $\mathbb{1}$ [old tax debt > 0] | 23.7% | | | | 77,578 |
| Young tax debt [in €] | 2,541.8 | 0 | 135,288 | 106,908 | 77,578 |
| $\mathbb{1}$ [young tax debt > 0] | 46.1% | | | | 77,578 |
| **Industry sector composition** | | | | | |
| Primary | 12.2% | | | | 77,578 |
| Secondary | 16.5% | | | | 77,578 |
| Tertiary | 71.3% | | | | 77,578 |
| **Tax registry information** | | | | | |
| Capital 2011 | 2,382,862 | 144,719 | 40,375,752 | | 36,884 |
| # Employees 2011 | 11.5 | 2 | 93.8 | | 36,884 |
| Years since Foundation | 11.0 | 8 | 10.2 | | 77,578 |
| **Panel (b): The self-employed** | | | | | |
| **Tax debt** | | | | | |
| Old tax debt | 1,452.7 | 0 | 13,466 | 1,944 | 58,507 |
| $\mathbb{1}$ [old tax debt > 0] | 24.8% | | | | 58,507 |
| Young tax debt | 399.7 | 0 | 2,013 | 1,839 | 58,507 |
| $\mathbb{1}$ [young tax debt > 0] | 59.3% | | | | 58,507 |
| **Tax registry information** | | | | | |
| $\mathbb{1}$ [gender = male] | 76.4% | | | | 58,507 |
| Age | 44.4 | 44 | 10.9 | | 58,507 |

*Notes:* Old tax debt refers to tax debt that is more than 90 days overdue; young tax debt refers to tax debt weakly less than 90 days overdue. The mean, median, and standard deviation (SD) of tax debt are as of November 29, 2012 (the adoption of the shaming law). We calculate the within SD of tax debt as $taxdebt_{i,t} - \overline{taxdebt_i} + \overline{\overline{taxdebt}}$ with monthly data from January to November 2012 (pre-treatment months) recorded on the 25th. Industry composition and tax registry information are as of 2012. SDs and medians are unreported for the dummy variables.

capital and the number of employees is available for a subsample of 36,884 corporations. On average, these corporations have capital of €2.4 million and employ 12 people.

Panel (b) presents the descriptive statistics of the self-employed. Tax debts are even more prevalent than among corporations. One-quarter of self-employed individuals have old and 59% have young tax debt. However, the tax debt amounts of the self-employed are considerably smaller. On average, €1,453 (€400) are overdue for more (weakly less) than 90 days. The average age of the self-employed is 44 years and 76% of them are men.

Figure 2 exploits an important feature of our data set, namely that we can accurately measure tax debt before, during, and after the introduction of the shaming law. The figure plots the tax debt of corporations from July 2012 to the end of 2013, distinguishing between tax debt more than 90 days overdue (orange line) and tax debt weakly less than 90 days overdue (black line). The bulk of total tax debt is more than 90 days overdue ("old tax debt"). Old tax debt is directly affected by the shaming law, and we expect the greatest part of the response to happen in old tax debt. Tax debt weakly less than 90 days overdue ("young tax debt") may only indirectly be affected by the shaming law if the law improves general tax payment discipline. In

**Figure 2:** Aggregate Tax Debt of Corporations and the Self-Employed
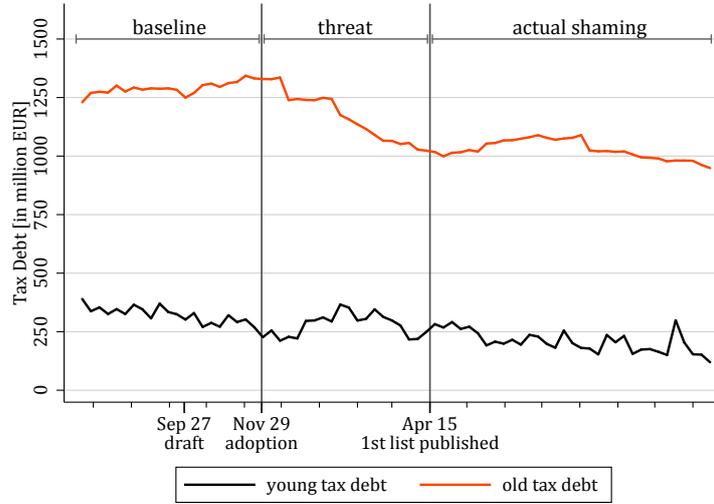


*Notes:* This figure plots aggregate tax debts of corporations and self-employed individuals. It distinguishes between tax debts that are weakly less than 90 days and tax debts that are more than 90 days overdue (weekly data). The figure covers July 1, 2012 to December 31, 2013.

the figure, we can distinguish three periods of time: (i) the time period before the adoption of the shaming law on November 29, 2012 ("baseline"), (ii) the time period after the adoption but before the publication of the first shaming list ("threat"), and (iii) the time period after the publication of the first shaming list on April 15, 2013 ("actual shaming"). After being rather stable in the baseline, old tax debt experiences a sharp drop in the period of threat. In this time window, old tax debt plummets from more than €1.3 to about €1 billion. With actual shaming, the downward trend continues but at a slower pace. These findings are consistent with the significant impact of public shaming on behavior (in the periods of both threat and actual shaming).

As these aggregate figures might be confounded by extraneous factors unrelated to the shaming law, we describe our empirical approach used to identify the causal effects of the threat of shaming and of actual shaming on taxpayer behavior in the following section.

## 3. Empirical Strategy

We first consider the response to the **threat of shaming**. To do so, we exploit the fact that taxpayers were unequally likely to have old tax debt above €5,000 before the shaming law. Crucial to this approach is that the probability of having old tax debt above €5,000 in earlier times determines a taxpayer's exposure to the shaming law: taxpayers with a high ex ante probability of tax debt above €5,000 are more likely to be shamed (if they do not adjust their payment habits). We use individual tax debt histories to calculate the ex ante shaming probability as

$$\text{shaming probability}_i = \frac{1}{D} \times \sum_{d}^{D} \mathbb{1}\left[\text{old tax debt}_{i,d} > 5,000\right], \tag{1}$$

where $\mathbb{1}$ is an indicator function equal to 1 if the tax debt stock more than 90 days overdue exceeds €5,000 on day $d$. In essence, we calculate the old tax debt stock for each taxpayer on every day from January 1, 2012 ($d = 1$) to November 28, 2012 ($D = 333$)—that is, from the beginning of our observation period to the day before the adoption of the law—and then count how many days a taxpayer would have been shamed on a hypothetical shaming list with the same thresholds as the adopted law. The shaming probability is then simply the share of days a taxpayer would have been shamed if the law had existed before. Figure A.4 in the Appendix shows considerable variation in the shaming probability that we can exploit for identification.

The empirical strategy is to compare changes in tax debt for taxpayers with a high shaming probability with those for taxpayers with a low shaming probability. Conceptually, our approach results in a difference-in-differences estimation with varying treatment intensities (instead of a binary treatment assignment). Similar approaches have been applied in different contexts by Rajan and Zingales (1998), Finkelstein (2007), Mian and Sufi (2012), and Fort (2017).

We first consider tax debt more than 90 days overdue (which we hereafter term "tax debt"). We estimate the following ordinary least squares (OLS) regression to empirically identify the threat of shaming:

$$\%\Delta\text{tax debt}_{i,t} = \alpha + \beta_1 \text{shaming probability}_i \times \text{Dthreat}_t$$
$$+ \beta_2 \text{shaming probability}_i + \beta_3 \text{Dthreat}_t + \gamma ln(X_{i,2011}) + \delta_i + \varepsilon_{i,t}. \tag{2}$$

Our estimation sample for the threat of shaming covers July 1, 2012 to March 25, 2013 (leaving aside the period of actual shaming). $\text{Dthreat}_t$ is a dummy variable indicating the period of the shaming threat (after the adoption of the shaming law). In some of the regressions, we include either a corporation fixed effect $\delta_i$ or a vector of control variables $X_i$ (corporation age, capital, and the number of employees in 2011). $\varepsilon_{i,t}$ represents the error term. The coefficient of interest $\beta_1$ measures the impact of the shaming threat on tax debt in percent.

For the change in tax debt, we compare a taxpayer's level of tax debt on the 25th of month $t$ to tax debt on the 26th of month $t-1$. Changes in tax debt may be large and tax debt can be zero. Using a simple percentage change method of calculation would thus lead to many missing values. Instead, we calculate the relative change in tax debt according to the midpoint formula. That is, we express the change in tax debt between two periods in relation to the average tax debt level in both periods. To keep the relative change bounded between -1 and 1, we multiply by 0.5:

$$\%\Delta\text{tax debt}_{i,t} = 0.5\left[\frac{\text{tax debt}_{i,t} - \text{tax debt}_{i,t-1}}{0.5(\text{tax debt}_{i,t} + \text{tax debt}_{i,t-1})}\right]. \tag{3}$$

We also consider the effect of the shaming threat on the probability of being in tax debt and on the probability of having tax debt larger than € 5,000. Here, we estimate a linear probability model:

$$\mathbb{1}\,[\text{tax debt}]_{i,t} = \alpha + \beta_1 \text{shaming probability}_i \times \text{Dthreat}_t$$
$$+ \beta_2 \text{shaming probability}_i + \beta_3 \text{Dthreat}_t + \gamma ln(X_{i,2011}) + \delta_i + \varepsilon_{i,t}, \tag{4}$$

where $\mathbb{1}\,[\text{tax debt}]_{i,t}$ is an indicator of taxpayers with strictly positive tax debt or, alternatively, taxpayers with tax debt strictly larger than € 5,000. We estimate equation (4) by linear regression (Angrist and Pischke 2008) and probe the robustness of our findings, estimating linear probability models.

Individual shaming probabilities before the introduction of the shaming law are not randomly assigned. Hence, to be able to identify a causal effect, two identifying assumptions need to hold. First, in the absence of the shaming law, any baseline differences would have continued on the same trends ("common trend assumption"). Figure A.5 in the Appendix shows that there are no structural breaks in the assessment of taxes during our study period. This also holds conditional on shaming probabilities (Figure OA.1 in the Online Appendix). Second, there should be no selection into treatment. The shaming thresholds were chosen irrespective of the distribution of tax debts. In addition, thresholds were switched around during the legislative procedure. For instance, the draft of the law aimed to shame all taxpayers with tax debt over € 4,000 that was more than 60 days overdue. The purely accidental choice of the thresholds makes selection into treatment unlikely. To alleviate the remaining concerns, Figure A.6 in the Appendix shows that the shaming probability is uncorrelated with corporation size (measured by capital and the number of employees) and corporation age. Hence, there is no evidence for selection into treatment.

Next, we focus on **actual shaming**. Here, taxpayers endogenously select into treatment, as the shaming list was publicly announced four months before its implementation and taxpayers had the possibility to avoid actual shaming by paying their tax debt early. However, taxpayers may not pay their tax debt and end up being named-and-shamed for two reasons. First, they may be unable to pay because of financial constraints. Second, the shaming incentive may not be sufficiently large to trigger a behavioral response. That is, taxpayers may assess the expected social costs of naming-and-shaming and still be unwilling to pay.

Actual shaming is unlikely to be an effective tool for reducing tax debt among financially constrained tax delinquents. On the contrary, the shaming list may signal reduced financial strength to banks and commercial partners. Hence, being part of the shaming list is likely to damage reputation, increase the cost of financing, and deteriorate terms of payment (even though the systematic use of the shaming list for these purposes by banks and commercial partners is illegal). We thus expect the liquidity constraints of financially constrained tax delinquents to become (weakly) more binding with actual shaming.

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Yet, a case for actual shaming arises from tax delinquents that had false expectations. If the social costs of being named-and-shamed are larger than anticipated, actual shaming may lead some of the first unwilling tax delinquents to engage in social learning and pay their tax debt. Social costs may be larger than expected for two reasons. First, the shaming list informs of a social norm and allows for peer comparisons as it makes the number of tax delinquents and tax debt amounts of tax delinquents public knowledge. Taxpayers can thus learn the strength of the social norm: the fewer the tax delinquents on the list (and the lower the tax debt overdue), the stronger is the social norm and the larger are the social costs of violating that social norm. Second, tax delinquents may underestimate the social costs of being named-and-shamed. In several newspapers, local taxpayers have been singled out in articles reporting on the shaming list. Due to such media coverage of tax delinquents the social costs of being named-and-shamed may be larger than expected. Hence, public shaming may trigger social learning (Manski 2000; Fershtman and Segal 2018) and may thus be effective at reducing tax debt.

Our estimation sample for actual shaming consists of all shamed tax delinquents. We aim to estimate the change in their tax debts driven by actual shaming and social learning. Three points are thus important for our empirical analysis. First, the information value for a taxpayer is the largest from observing the taxpayers in his or her reference group (Wenzel 2004; Gino and Ariely 2009), such as taxpayers in the same industry and region. This leads us to group taxpayers by industry and region when measuring social learning. Second, while the tax debt of shamed taxpayers becomes public knowledge, the tax payment behavior of non-shamed taxpayers remains private information, even under the shaming law. This implies a clear direction of social learning: Social learning among shamed and non-shamed taxpayers occurs from shamed tax delinquents (but not from non-shamed taxpayers). Obviously, the set of information of a taxpayer and thus social learning remain unobservable. We thus proxy for social learning with the behavioral response that it triggers among non-shamed taxpayers. Importantly, our measure of social learning focuses on non-shamed taxpayers as they are not directly affected by the shaming list; any behavioral response to the shaming list among these taxpayers can be fully attributed to social learning. Third, before the first shaming list, shamed taxpayers perceive the social norm as (weakly) stronger than do non-shamed taxpayers, as revealed by their initial tax debt levels. Hence, the first shaming list leads to (weakly) more social learning among shamed tax delinquents than among non-shamed taxpayers. In other words, we measure social learning among shamed tax delinquents with error. This approach may introduce a classical errors-in-variables problem and may bias the effect of actual shaming towards zero (attenuation bias). To sum up, identifying the effects of actual shaming involves computing measures of social learning within industry-region groups and relating these measures to tax debt.

To empirically identify the effect of actual shaming on the tax debt of shamed tax delinquents, we estimate the following OLS regression:

$$\%\Delta \text{tax debt}_{i,r,s,p} = \kappa + \theta \text{social learning}_{\text{non-shamed},r,s,p} + \gamma ln(X_{i,2011}) + \varepsilon_{i,r,s,p}, \tag{5}$$

where the dependent variable is the relative change in tax debt among shamed tax delinquents in period $p$. social learning$_{\text{non-shamed},r,s,p}$ denotes social learning among non-shamed taxpayers from the publication of the shaming list in region ($r$) and industry sector ($s$) until period $p$.[21] In our robustness checks, we include a vector of the control variables $X_i$, which includes growth rates in value added at the industry level[22], corporation age, capital, and the number of employees in 2011. $\varepsilon_{i,r,s,p}$ is an error term. We estimate an analogous specification for the probability of reducing tax debt by strictly more than 5% and strictly more than 10%.[23]

$\theta$ is the coefficient of interest that captures the impact of social learning on tax debt. We expect the effect of the shaming lists to increase in social learning. Social learning is proxied for with the share of non-shamed taxpayers whose tax payment discipline improves with the publication of the shaming list:

$$\text{social learning}_{\text{non-shamed},r,s,p} = \frac{1}{N_{r,s}} \times \sum_{n=1}^{N_{r,s}} \mathbb{1}\left[\%\Delta \text{tax debt}_{n,r,s,after} < \%\Delta \text{tax debt}_{n,r,s,before}\right], \tag{6}$$

where $\mathbb{1}$ is an indicator function equal to 1 if a taxpayer's relative reduction in tax debt after the publication of the shaming list is larger than it was before or if a taxpayer's relative increase in tax debt is smaller than before. For instance, the indicator takes 1 if a taxpayer reduces his or her tax debt by 10% before the shaming list and by more than 10% thereafter (or if tax debt increases by 10% before but by less than 10% after the publication of the shaming list). A higher share of taxpayers with improving tax payment discipline among the non-shamed in a peer group reveals a higher degree of social learning.

We consider the effects of actual shaming and social learning after the publication of the first shaming list. If taxpayers have false expectations on the social norm and the social costs of violating it, the first shaming list may bring about substantial social learning. Then, actual shaming further reduces tax debt beyond the levels reached with the threat of shaming. Social learning from later lists is expected to be close to zero, as these lists convey less additional information: The shaming list is surprisingly persistent over time: 96% of the delinquent corporations and individuals shamed on the second list featured on the first list.

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[21]To avoid censoring, we only consider non-shamed taxpayers with strictly positive tax debt levels both before shaming and on the publication date of the shaming list. In each of the 16 administrative regions, we consider 20 industry sectors.

[22]The information on value added growth rates by industries are published by the statistical office of Slovenia (http://www.stat.si/statweb/en/home).

[23]All the extensive margin results reported are robust to estimating a logit model.

The corresponding figures for comparing the third and fourth shaming lists to the first list are 92% and 91%, respectively.[24]

The empirical approach is to examine whether there is a break in any pre-existing differences in the trend of tax debt around the publication of the first shaming list on April 15, 2013. Our approach yields a causal effect if the common trend assumption holds. In our context, this says that the change in the tax debts of shamed tax delinquents would have been the same in industries both with little and with significant social learning. One might be concerned that macroeconomic shocks may have heterogeneously affected the tax debt of these industries through the number and amounts of new tax items. Figure OA.2 in the Online Appendix shows that the average weekly amounts of due tax items smoothly evolve for industries with little and with significant social learning over our observation period, alleviating concerns of economic shocks at the region-industry level.

Note that we do not know the sectors of industry of the self-employed. As we also lack information on other characteristics with which to determine the social reference group of self-employed individuals, we focus our analysis of actual shaming on corporations.

The size of the effect of actual shaming depends both on the magnitude of social learning and on the underlying distribution of tax delinquents that are unable and unwilling to pay. The underlying distribution of those types in the population is also important for the welfare consequences of the policy; we return to this point later. Social learning can also take place among previously compliant taxpayers, who may find general payment discipline poorer than they thought. This may trigger unintended behavioral responses through contagion (Gino and Ariely 2009), which we discuss in Section 5.

## 4. Empirical Results

In the first part of our analysis, we present empirical evidence on the threat of shaming. In the second part, we focus on actual shaming.

### 4.1. Impact of the Threat of Shaming

We begin by estimating the impact of the threat of shaming on corporations. Then, we present related results for the self-employed and probe the robustness of our results. Finally, we describe the heterogeneity in the treatment response.

**Corporations.** The shaming law introduces an incentive to pay tax debt before the law is implemented to avoid shaming, particularly for taxpayers with a high ex ante shaming probability. We expect taxpayers

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[24]The persistence in the composition of shamed tax delinquents also prevents us from studying the probability of leaving the shaming list as an outcome variable.

**Figure 3:** Tax Debt by Shaming Probability: Corporations
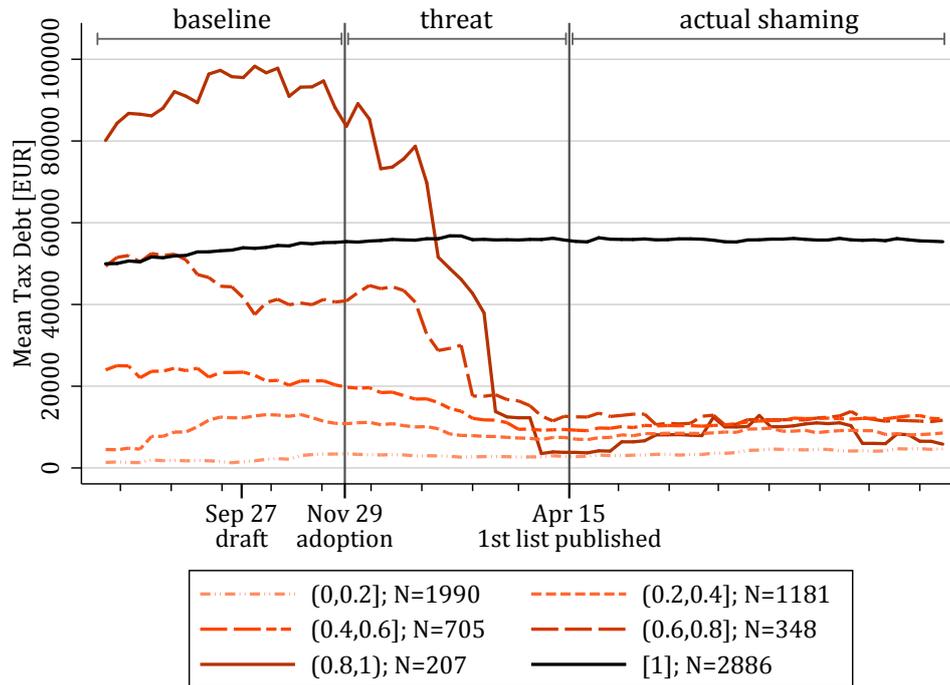


*Notes:* This figure displays the average tax debt for different groups of corporations based on their shaming probability. Tax debt refers to tax debt more than 90 days overdue. The figure covers July 1, 2012 to December 31, 2013. To limit the effect of extreme values, we exclude from the figure taxpayers with average tax debt above the $99^{th}$ percentile in each group.

with a positive ex ante shaming probability to reduce their tax debt and the response to weakly increase in the shaming probability. Figure 3 presents evidence on such behavior by depicting the development of tax debt by shaming probability between July 2012 and December 2013.

Four points are of note. First, after the adoption of the shaming law, we observe a sharp decline in average shaming debt. This decline continues until the first shaming list is compiled. Second, the effect is most pronounced among corporations with a shaming probability between 80% and 100% (excluding interval boundaries, $N = 207$). Within four months, these corporations dramatically reduce average shaming debt from above € 80,000 before the adoption of the law to about € 5,000 (the threshold amount) at the end of the period of threat. Third, corporations with a lower shaming probability also reduce their tax debt but to a lesser extent. Overall, the payment behavior during the period of threat substantially reduces the variation in tax debt, leading to a convergence between the shaming probability groups. Fourth, corporations with a shaming probability of 100% ($N = 2886$) stand out: on average, these corporations do not respond and maintain high tax debt levels of € 50,000 to € 60,000. The inertia of these corporations might point to binding financial constraints. While we do not have detailed information about the financial health of individual corporations, we do know whether a corporation is in insolvency proceedings, which can be considered an extreme form of financial constraint. Looking at the full population of Slovenian corporations,

**Figure 4:** Payment vs. Due Stock by Shaming Probability: Corporations
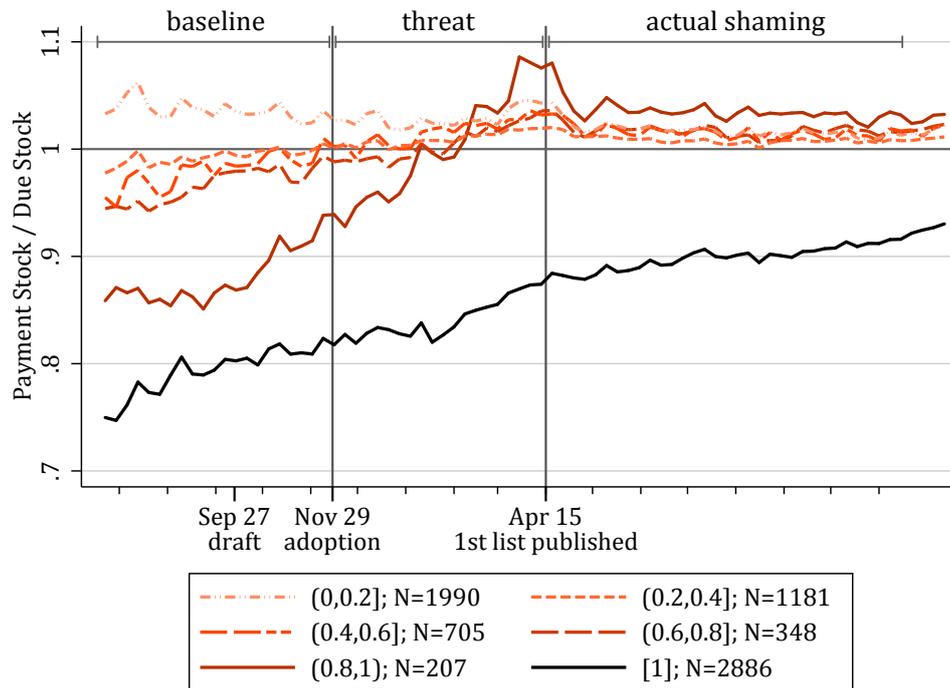


*Notes:* The figure displays the ratio between total payments made (payment stock) and total amount due (due stock, i.e. the sum of all tax items due) on a given date. The figure covers July 1, 2012 to December 31, 2013. The stocks are calculated for each date between January 1, 2012 and December 31, 2013. For example, the payment stock (due stock) on November 29, 2012 includes all tax payments made (all tax items due) between July 1 and November 29, 2012. A ratio of 1 means that all tax items are paid on time. A ratio less than 1 means that a taxpayer accumulates tax debt. A ratio greater than 1 means that a taxpayer reduces tax debt or a previously compliant taxpayer makes tax payments before the due date.

we find a strong discontinuity in the likelihood of insolvency at the shaming probability of 100%: The likelihood of insolvency for corporations with a shaming probability of 100% is 13.4%, compared to only 3.1% for those with a shaming probability of above 80% to below 100% (and 3.6% for those with a strictly positive shaming probability below 100%). Hence, a shaming probability of 100% is associated with an about 4 times larger probability of insolvency proceedings. Note that taxpayers in insolvency proceedings are excluded from our estimation sample. That is, insolvency proceedings themselves cannot explain the weak response of corporations with shaming probability of 100%. However, the discontinuity may be taken as evidence that financial constraints are particularly large for corporations with shaming probability of 100%.

To dig deeper into the impact of the threat of shaming, we take a different perspective and consider the active payment response of taxpayers. Payments made not only depend on tax debt but also on new tax items that become due. We can thus think of the ratio between payments made and new tax items due as a measure of taxpayers' payment discipline. This ratio is 1 if taxpayers pay what becomes due, the ratio is smaller than 1 if taxpayers accumulate tax debt, and it is larger than 1 if taxpayers not only pay new tax items due but also pay off tax debt accumulated in the past. Figure 4 follows this approach and relates

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the stock of tax payments made to the stock of new tax items due.[25] The stock of tax payments made ("payment stock") is calculated at different points in time as the sum of the payments made until then since January 1, 2012. Analogously, the stock of new tax items due ("due stock") is given by the sum of all tax items that became due between January 1, 2012 and the point in time considered. A horizontal line of the payment-due-ratio reflects unchanged payment discipline, whereas a positive slope indicates improvements in payment discipline.

The graph clearly shows that payment discipline improves with the adoption of the shaming law. The ratio of payments made to tax items due shows a clear upward trend, particularly after the adoption of the shaming law (while the draft of the law has a positive but small effect on payment discipline). That is, corporations increase their payments to the tax administration in relation to the amount of tax items due. This effect is most pronounced in the groups of taxpayers with a high shaming probability. The payment-due-ratio rises above 1 (except for the group of taxpayers with a shaming probability of 100%) until the shaming law is implemented. That is, the average taxpayer pays more than what becomes due. Payment discipline reaches a new equilibrium in which the average taxpayer pays off debt incurred in the past. Taxpayers with a low shaming probability exhibit a payment-due-ratio above 1 from the start, which means that they clear their outstanding tax items before the due date. We again find that the shaming law reduces the variation across groups of taxpayers and leads to converging payment-due-ratios. This result is in line with our findings on tax debt even though the two figures are not directly comparable, as Figure 4 offers no interpretation in terms of debt levels.[26] Taken together, the results suggest that the threat of shaming significantly reduces tax debt and improves overall tax payment discipline.

Next, we quantify the impact of the threat of shaming in linear regressions. We estimate equation (2) by using OLS, with the relative change in tax debt as the dependent variable. From Figure 3, we know that the group of taxpayers with a shaming probability of 100% stand out in their response to the shaming threat (as they may be financially constrained). To take this into account, we separately estimate the effects for this group. To do so, we include a dummy variable D100, indicating these taxpayers, and interact the dummy variable with the dummy of the period of the shaming threat.[27] Table 2 presents our core results on how tax debt is causally affected by the shaming threat. We find that introducing a shaming threat significantly

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[25]An alternative would be to calculate the ratio of payments made and new items due based on flow variables. This measure turns out to be noisy. For instance, slightly late payments lead to a small payment due ratio when the items are due and a large ratio when the payment is actually made. In addition, when using flow variables, the bin size becomes important. For all these reasons, we prefer to calculate the payment-due-ratio based on stock variables.

[26]The reason is that tax debt levels also depend on the amount of new tax items that fall due. An increase in the payment-due-ratio can thus be consistent with both falling and increasing tax debt depending on the amount of new tax debt.

[27]To calculate the effect of the shaming threat on those taxpayers, we have to combine the interaction term between the shaming probability and Dthreat (multiplied by 1) with the interaction term between D100 and Dthreat. This reveals the lack of response among taxpayers with a shaming probability of 100%, consistent with Figure 3.

**Table 2:** Effect of the Shaming Threat on Tax Debt: Corporations

| Dependent variable: | OLS | | | FE |
|---|---|---|---|---|
| %Δtax debt$_{i,t}$ | (1) | (2) | (3) | (4) |
| Shaming Probability × Dthreat(0/1) | −0.075*** | −0.075*** | −0.057*** | −0.075*** |
| | (0.011) | (0.011) | (0.013) | (0.011) |
| Dthreat(0/1) | −0.020*** | −0.020*** | −0.018*** | −0.017*** |
| | (0.001) | (0.001) | (0.002) | (0.001) |
| Shaming Probability | −0.023*** | −0.026*** | −0.027*** | |
| | (0.007) | (0.007) | (0.008) | |
| D100(0/1) × Dthreat(0/1) | 0.085*** | 0.085*** | 0.058*** | 0.085*** |
| | (0.011) | (0.011) | (0.013) | (0.011) |
| D100(0/1) | 0.023*** | 0.023*** | 0.035*** | |
| | (0.007) | (0.007) | (0.008) | |
| | | | | |
| Corporation Age | | | ✓ | |
| Capital in 2011 | | | ✓ | |
| # Employees in 2011 | | | ✓ | |
| Tax Office FE | | ✓ | ✓ | |
| Industry FE | | ✓ | ✓ | |
| Legal form FE | | ✓ | ✓ | |
| Corporation FE | | | | ✓ |
| Month FE | ✓ | ✓ | ✓ | ✓ |
| Observations | 698,202 | 698,202 | 331,956 | 698,202 |
| # Corporations | 77,578 | 77,578 | 36,884 | 77,578 |

*Notes:* Standard errors clustered at the taxpayer level are in parentheses. Tax debt refers to tax debt more than 90 days overdue. *** denotes significance at the 1% level.
*Sample:* All corporations.

reduces tax debt. Column (1) includes period fixed effects only. Our preferred specification in column (2) additionally includes tax office, industry, and legal form fixed effects to purge any systematic differences from the regression. The interaction term of the Shaming Probability x Dthreat yields a coefficient of interest equal to -0.075 (column (2)). Evaluating the coefficient of -0.075 at the sample average (i.e., a shaming probability of 29.3%)[28] shows that the threat of shaming reduces tax debt by 2.2% per month. This effect is economically and statistically significant.

In further specifications, we probe the robustness of our result. Column (3) includes corporation age, capital, and the number of employees in 2011 as further control variables. Information on the control variables is available for about half of the sample only. Although the estimate of the causal effect of the shaming threat is somewhat smaller in the restricted sample (-0.057 vs. -0.075 with a *p*-value of 0.01), we still find that the shaming threat is effective at reducing tax debt. Since the restricted sample oversamples large corporations, we return to our preferred specification and additionally include taxpayer individual fixed effects (column (4)). Our results are virtually unchanged, which shows the substantial amount of "within" variation in the data that we exploit for identification.

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[28]The sample average is calculated among taxpayers with a strictly positive shaming probability below 100%.

Interestingly, tax debt falls significantly for all taxpayers with the shaming threat (statistically significant coefficient of -0.02 for Dthreat). This decline is consistent with the tax administration sending a general signal about the non-acceptability of tax debt (see literature on expressive function of the law, e.g., Sunstein 1996; Bénabou and Tirole 2011). However, the effect of such a signal cannot be causally identified here, which leads us to underestimate the total effect of the shaming policy. We note that the reduction implied by Dthreat may also be driven by other macroeconomic factors.

The threat of shaming was in place for four months (from November 29, 2012 to March 25, 2013). We calculate the total impact of the threat of shaming over these four months as $(1 + \hat{\beta}_1 \times \text{Shaming Probability})^4 - 1$, using the average shaming probability of 29.3% in our sample. On average, the threat of shaming reduces tax debt by 8.5%. When the shaming threat became effective on November 29, 2012, Slovenian corporations overall had accumulated €1.22 billion in tax debt older than 90 days. Thereof, €631 million belong to corporations in our estimation sample, which excludes corporations in insolvency proceedings and corporations that are economically inactive. Owing to the threat of shaming, the tax administration could collect additional tax revenue of €54 million alone from these corporations over the course of these four months.[29] Remember that Slovenia introduced the shaming policy to enforce tax debt which turned out to be uncollectable with the enforcement measures in place (see Section 2). In Figure 3 and Figure 4 we have seen that the shaming law was effective in achieving this goal: After the adoption of the shaming law, there is a marked reduction in tax debt levels and an increase of payment-due-ratios to above one. After the publication of the first shaming list, the tax debt levels and the payment-due-ratios stabilize again. This suggests that taxpayers reach a new equilibrium. Together with the previous point, this implies that the tax revenues collected with the shaming policy are indeed additional tax revenues (and not just payments brought forward).

Table 3 digs deeper by considering alternative outcome variables. We present the results on the probability of having tax debt larger than €5,000 and on the probability of being in tax debt (equation (4)). For each of these outcomes, we show the responses in our preferred specification and in the specification including fixed effects. All the effects are evaluated at the average shaming probability of 29.3% in our sample. The table reveals the additional insight that the threat of shaming is effective for large parts of the taxpayer population (and cannot be explained by some taxpayers sharply cutting back their tax debts).

Columns (1) and (2) show that the shaming threat reduces the probability of having tax debt larger than €5,000 by 12.5 percentage points[30] and the probability of having tax debt by 10 percentage points

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[29]This corresponds to 9% of the annual corporate income tax revenue or 0.5% of the annual total tax revenue, including social security contributions.

[30]Altogether, 5.7% of the corporations in our sample have tax debt larger than €5,000 and more than 90 days overdue. The relative effect is thus $(-0.431 \times 0.291)/0.057$ = -220%.

**Table 3:** Effect of the Shaming Threat on Prevalence of Tax Debt: Corporations

| Dependent variable: | $\mathbb{1}\left[\textbf{tax debt}_{i,t} > 5,000\right]$ | | $\mathbb{1}\left[\textbf{tax debt}_{i,t} > 0\right]$ | |
|---|---|---|---|---|
| | **OLS** | **FE** | **OLS** | **FE** |
| | (1) | (2) | (3) | (4) |
| Shaming Probability $\times$ Dthreat(0/1) | $-0.431^{***}$ | $-0.431^{***}$ | $-0.347^{***}$ | $-0.347^{***}$ |
| | (0.015) | (0.015) | (0.015) | (0.015) |
| Dthreat(0/1) | $0.006^{***}$ | $0.005^{***}$ | $-0.068^{***}$ | $-0.065^{***}$ |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| Shaming Probability | $1.040^{***}$ | | $1.042^{***}$ | |
| | (0.013) | | (0.014) | |
| D100(0/1) $\times$ Dthreat(0/1) | $0.406^{***}$ | $0.406^{***}$ | $0.382^{***}$ | $0.382^{***}$ |
| | (0.015) | (0.015) | (0.014) | (0.014) |
| D100(0/1) | $-0.043^{***}$ | | $-0.254^{***}$ | |
| | (0.013) | | (0.013) | |
| Tax Office FE | ✓ | | ✓ | |
| Industry FE | ✓ | | ✓ | |
| Legal form FE | ✓ | | ✓ | |
| Corporation FE | | ✓ | | ✓ |
| Month FE | ✓ | ✓ | ✓ | ✓ |
| Observations | 698,202 | 698,202 | 698,202 | 698,202 |
| # Corporations | 77,578 | 77,578 | 77,578 | 77,578 |

*Notes:* Standard errors clustered at the taxpayer level are in parentheses. Tax debt refers to tax debt more than 90 days overdue. *** denotes significance at the 1% level.
*Sample:* All corporations.

or -43%.[31] Our finding that the shaming threat also reduces the probability of tax debt (and not only the probability of tax debt above €5,000) suggests that the shaming law has also been an effective tool for enforcing smaller tax debt amounts (which may rise above the threshold over time). All these findings are robust to estimating linear probability models.

Taken together, the threat of shaming reduces tax debt, when we consider both total responses (as measured by the relative change in tax debt) and extensive margin responses (as measured by the probability of exhibiting various tax debt levels).

**The Self-Employed.** Next, we show how the shaming threat causally affects the tax debt of the self-employed. As before, Table 4 presents the results from our baseline specification and from a specification with individual fixed effects for all outcomes. While we lack the statistical power to find a statistically significant effect on the relative change in tax debt (columns (1) and (2)) in our panel estimations, we do find economically and statistically significant effects in a simpler difference-in-differences analysis. In these simpler difference-in-differences analyses, we estimate the effect of the shaming threat on tax debt by comparing tax debt at two moments in time (instead of considering all the monthly changes in between). Specifically, we compare individual tax debt levels at the end of the threat period (March 2013) with tax debt

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[31]23.7% of the corporations in our sample have tax debt more than 90 days overdue (see Table 1). The relative effect is thus -43%: $(-0.347 \times 0.291)/0.237$.

levels in each of the four months before (starting with November 2012 as the last month before the adoption of the shaming law). These comparisons allow us to determine the overall effect of the shaming threat on tax debt as well as the dynamics in the payment behavior of the self-employed. Figure 5 illustrates that focusing on changes over longer periods is particularly meaningful for the self-employed whose tax amounts fluctuate substantially.[32] The first dot (printed in bright orange) shows the coefficient for the full period of threat (from November 2012 to March 2013). The coefficient of -0.162 implies that the threat significantly reduces tax debt by 5% for the average self-employed individual in our sample (average shaming probability of 30.7%). The other dots (printed in lighter orange) show the corresponding coefficients by subperiod. For instance, the second coefficient disregards the first month of threat and compares tax debt levels between March 2013 and December 2012. Comparing that coefficient of -0.083 with the coefficient for the full period of threat yields a statistically significant difference of -0.08. That is, the average self-employed individual reduces his or her tax debt by 2.5% ($-0.08 \times 30.7\%$) within the first month of threat. This corresponds to 50% of the overall reduction.

The impact on the self-employed is somewhat smaller than that on corporations.[33] This finding is in line with our expectations for three reasons. First, the tax debt levels of the self-employed are considerably below those of corporations. Because of the threshold amount of the shaming law of € 5,000, the self-employed have to change their behavior by less in order to avoid shaming. Second, the self-employed are more likely to be financially constrained as information constraints on potential lenders may be more severe for unincorporated firms (see, e.g., Liu and Devereux 2016). Third, being named-and-shamed may be particulary detrimental to business affairs of corporations. As with child labor and other issues of societal attention, many corporations include principles on tax affairs in their codes of conduct. Often, they impose sanctions on their business partners in case of non-compliance with the provisions included in the codes. Shamed tax delinquents may thus have to face significant consequences such as the cancellation of orders or the termination of business relationships.

Finally, we use the different outcome variables to probe further the impact of the threat of shaming on the tax debt of the self-employed. Table 4 shows that the threat of shaming significantly reduces the probability of having tax debt larger than € 5,000 by 39% (columns (3) and (4)).[34] Again, we find that the shaming threat extends to smaller tax debt amounts. The overall probability of tax debt is reduced by 6.75 percentage

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[32]These fluctuations are driven by both unsteady income and irregular tax self-assessment. For instance, many self-employed individuals have to self-assess their value added tax on a quarterly basis only. The yearly assessment of personal income tax takes place between the end of March and the end of May, which may lead to another temporary effect on tax debt for the self-employed.

[33]In Figure OA.3 in the Online Appendix we present results for the corresponding simpler difference-in-differences analyses for corporations. The point estimate for the full period of threat is -0.38, which corresponds to an average reduction of tax debt by 11% ($0.38 \times 29.3\%$). This is slightly larger than the reduction of 8.5%, that we calculated based on the monthly estimations in Table 2.

[34]24.8% of the self-employed individuals in our sample have tax debt more than 90 days overdue (see Table 1). The relative effect is thus $(-0.314 \times 0.307)/0.248 = -38.9\%$.

**Table 4:** Effect of the Shaming Threat on Tax Debt: The Self-Employed

| Dependent variable: | $\%\Delta$**tax debt**$_{i,t}$ | | $\mathbb{1}\left[\text{tax debt}_{i,t} > 5{,}000\right]$ | | $\mathbb{1}\left[\text{tax debt}_{i,t} > 0\right]$ | |
|---|---|---|---|---|---|---|
| | OLS | FE | OLS | FE | OLS | FE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shaming Probability | 0.013 | 0.013 | −0.314*** | −0.314*** | −0.220*** | −0.220*** |
| × Dthreat(0/1) | (0.013) | (0.013) | (0.021) | (0.021) | (0.018) | (0.018) |
| Dthreat(0/1) | −0.013*** | | 0.005*** | | −0.032*** | |
| | (0.001) | | (0.000) | | (0.002) | |
| Shaming Probability | −0.052*** | | 1.042*** | | 1.247*** | |
| | (0.008) | | (0.019) | | (0.020) | |
| D100(0/1) | 0.001 | 0.001 | 0.291*** | 0.291*** | 0.227*** | 0.227*** |
| × Dthreat(0/1) | (0.013) | (0.013) | (0.021) | (0.021) | (0.018) | (0.018) |
| D100(0/1) | 0.048*** | | −0.044** | | −0.429*** | |
| | (0.008) | | (0.019) | | (0.020) | |
| Tax Office FE | ✓ | | ✓ | | ✓ | |
| Taxpayer FE | | ✓ | | ✓ | | ✓ |
| Month FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 526,563 | 526,563 | 526,563 | 526,563 | 526,563 | 526,563 |
| # Selfemployed | 58,507 | 58,507 | 58,507 | 58,507 | 58,507 | 58,507 |

*Notes:* Standard errors clustered at the taxpayer level are in parentheses. Tax debt refers to tax debt more than 90 days overdue. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.
*Sample:* All self-employed individuals.

**Figure 5:** Effect of the Shaming Threat on Tax Debt: The Self-Employed
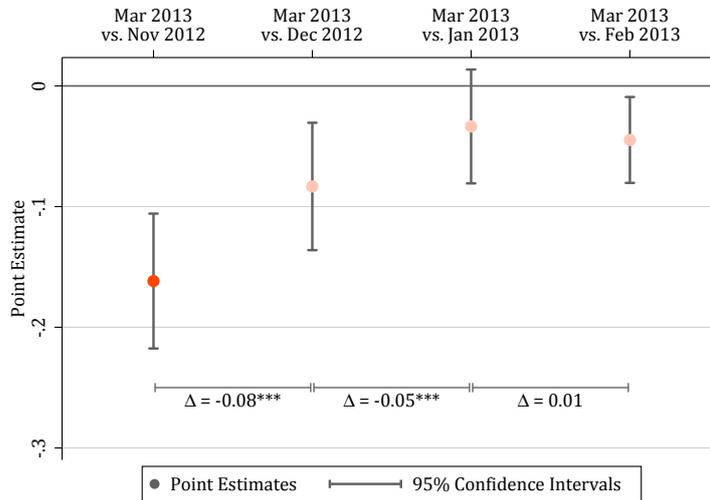


*Notes:* The figure displays the estimated effect of the shaming threat on tax debt, focusing on various time comparisons. Tax debt refers to tax debt older than 90 days. The coefficients are estimated as in column (1) in Table 4, but with the overall change in tax debt between the two indicated dates (instead of considering all the monthly changes in between). The first dot (printed in bright orange) shows the coefficient for the full period of threat. The subsequent dots (printed in lighter orange) show the corresponding coefficients by subperiod. The whiskers indicate the 95% confidence intervals (with robust standard errors). Each of the $\Delta$ coefficients refers to a single month of the shaming threat. For instance, $\Delta = -0.08^{***}$ is the estimated coefficient for the first month of the shaming threat, which is statistically different from zero at the 1% level.

**Figure 6:** Effect of the Shaming Threat on Tax Debt by the Shaming Probability: Corporations
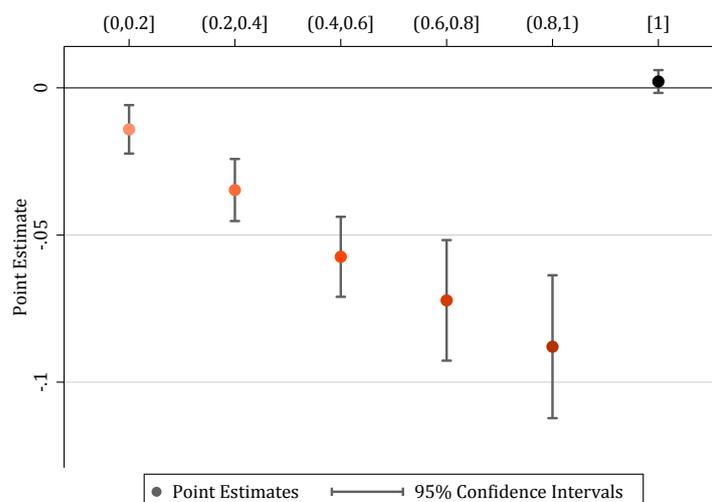


*Notes:* The figure displays the monthly relative change in tax debt for different ranges of the shaming probability. Tax debt refers to tax debt more than 90 days overdue. The coefficients are estimated as in column (2) in Table 2, but we interact the period of threat dummy with dummy variables for the six shaming probability groups (instead of a continuous shaming probability). The effect of the baseline shaming probability on the change in tax debt is assumed to be constant across the shaming probability groups. Taxpayers with a shaming probability of 0% are the baseline group. The whiskers indicate the 95% confidence intervals (with cluster robust standard errors at the taxpayer level).

points among the self-employed (columns (5) and (6)).[35] All these findings for the self-employed confirm our results for corporations: the shaming threat significantly reduces tax debt.

**Robustness.** We have thus far assumed that the effect of the shaming threat linearly increases in the shaming probability. To more flexibly estimate the impact of the shaming threat for different shaming probabilities, we return to corporations and the relative change in tax debt as the dependent variable and replace the continuous shaming probability with six dummy variables. These dummy variables correspond to shaming probability ranges of $(0, 0.2]$, $(0.2, 0.4]$, ..., $(0.8, 1]$, and $[1]$ (as in Figure 3). Figure 6 shows the monthly relative reduction in tax debt for the shaming probability groups. The effect of the shaming threat increases linearly in the shaming probability. In other words, if a taxpayer is twice as likely to be affected by the shaming policy, he or she reduces her tax debt twice as much. The exception from this pattern is the group with a shaming probability of 100%, which has an estimated effect close to zero. We return to this observation in Section 5. These findings confirm that estimating a linear relationship between the shaming probability and tax debt is not restrictive.

**Heterogeneity.** We expect the policy to affect taxpayers differently depending on the social costs incurred. First, we expect corporations with high reputational concerns to more strongly respond to the policy. Reputational concerns should be particularly large for corporations that mainly sell to end customers such

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[35]5.2% of the self-employed have tax debt above €5,000 that is more than 90 days overdue. Hence, the relative effect is $(-0.220 \times 0.307)/0.052 = \text{-130\%}$.

as corporations in the tertiary sector. By contrast, we expect corporations to be less concerned about their reputation if they are mainly suppliers to other corporations such as corporations in the primary and secondary sectors. Second, corporations in non-exporting industries, which only serve the domestic market in Slovenia, are particularly dependent on having a good reputation in Slovenia compared with exporting industries. Thus, we expect corporations in non-exporting industries to more strongly respond to the policy. Third, compared with medium-sized corporations, large corporations have high visibility such that the social costs of shaming may be particularly large. Micro corporations, at the other end of the size spectrum, may also be particularly responsive to the shaming threat as their responsibilities are less distributed (and there are fewer people to blame for tax debt). Table A.1 in the Appendix provides the descriptive statistics on industry heterogeneity with respect to these sources of reputational concerns.

To investigate the heterogeneous treatment responses, we proceed in two steps. First, we estimate the average effect of the shaming threat, including individual fixed effects (as in column (4) in Table 2). Second, based on the fitted values from the difference-in-differences estimation, we predict the residual for each taxpayer and point in time. That is, we consider the difference between the observed and estimated reductions in tax debt. Negative residuals indicate taxpayers that reduce tax debt more than predicted by the average effect; positive residuals indicate taxpayers that reduce tax debt less than predicted by the average effect. We use this insight to check whether the treatment responses are heterogeneous. We compare the average residuals for subgroups of taxpayers and gauge whether the effects differ by sector, exporting status, and size. Figure 7 displays the results. Panel (a) shows that corporations in the tertiary sector reduce tax debt more than those in the primary and secondary sectors. Panel (b) reveals the impact of the shaming threat to be larger for corporations in non-exporting industries compared with corporations in exporting industries. Finally, Panels (c) and (d) investigate whether these effects differ by size. We measure corporation size by the number of employees and capital (both in 2011). We find a U-shaped relationship between size and the effect of the shaming threat. The residuals are particularly negative for micro and large corporations, which indicates an above-average response among these taxpayers. Most of the pairwise comparisons reveal statistically significant differences; the $p$-values of the $t$-tests are in the figure. Financial constraints cannot drive our results. When estimating the average effect of the shaming threat, we include individual fixed effects, which purge any observed and unobserved differences between taxpayers (such as financial constraints). All our heterogeneity analyses are thus consistent with the assertion that the impact of the shaming threat should vary with the social costs of being named-and-shamed.

Industry sector information is unavailable for the self-employed so that we cannot provide comparable analyses for the self-employed. What we can study, however, is whether the behavioral response of the self-employed to the shaming threat differs between sexes. There is a growing body of literature that provides

**Figure 7:** Heterogeneous Impact of the Shaming Threat: Corporations

**(a)** Industry Sectors



**(b)** Exporting vs. Non-Exporting Industries



**(c)** Corporation Size: Total Assets



**(d)** Corporation Size: Number of Employees
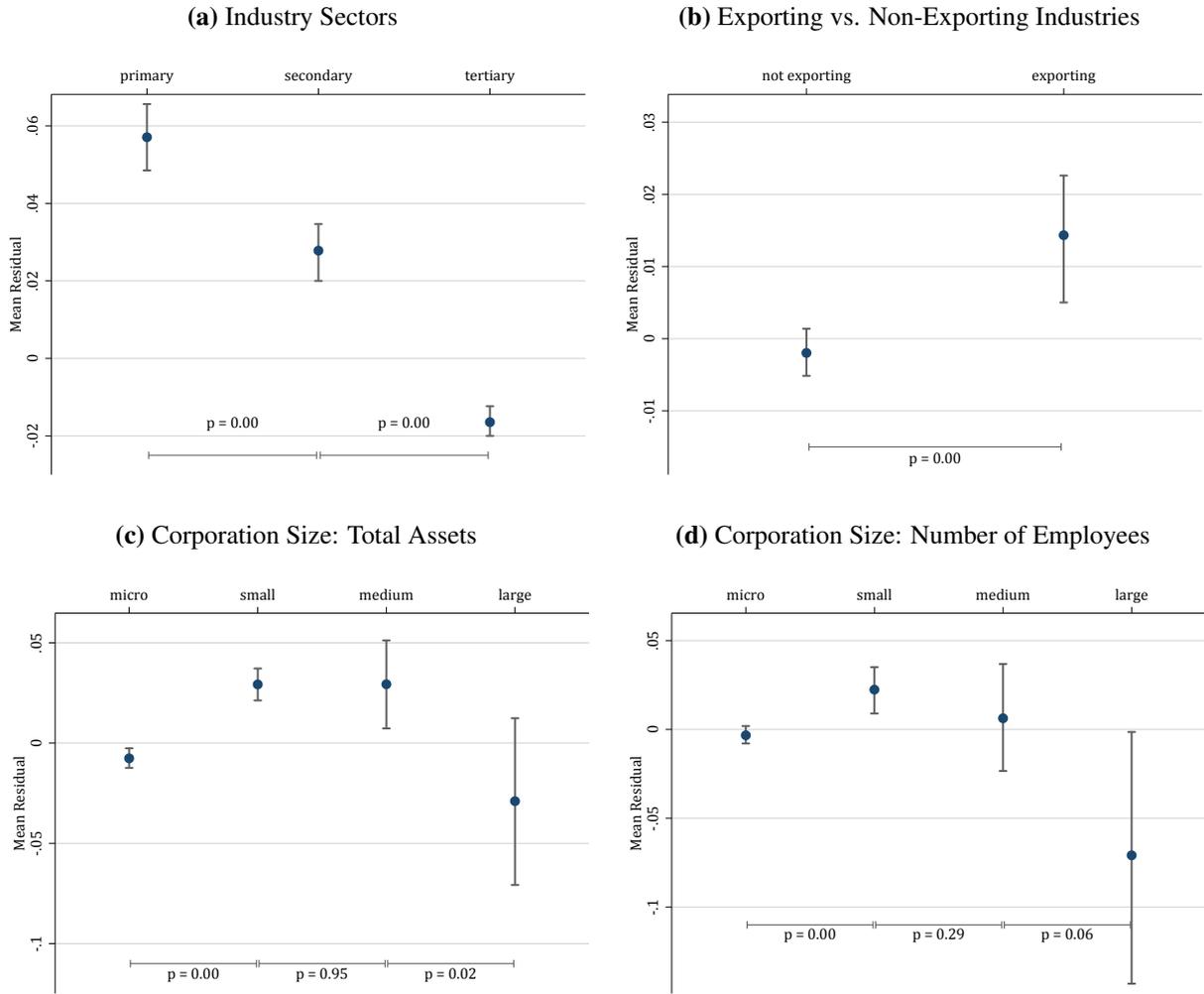


*Notes:* The figure displays the average residual by subgroup. In the underlying regression, we estimate the effect of the shaming threat, including individual fixed effects to purge any time-invariant differences between taxpayers (Table 2, column (4)). Negative (positive) residuals indicate a response to the threat of shaming above (below) the average response estimated in the full sample. We consider the following dimensions of heterogeneity. Panel (a): corporations in the primary, secondary, and tertiary sectors, Panel (b): non-exporting vs. exporting industries, Panels (c) and (d): micro, small, medium-sized, and large corporations. Corporation size in Panel (c) is based on total assets in million EUR in 2011 (micro: $<350,000$, small: $\geq 350,000$ and $<4$ million, medium-sized: $\geq 4$ million and $<20$ million, large: $\geq 20$ million). Corporation size in Panel (d) is based on the number of employees in 2011 (micro: $<10$, small: $\geq 10$ and $<50$, medium-sized: $\geq 50$ and $<250$, large: $\geq 250$). The whiskers indicate the 95% confidence intervals (bootstrapped with 400 replications).

evidence on the importance of gender stereotypes and gender identity for economic decisions (Akerlof and Kranton 2000; Bénabou and Tirole 2006; Bursztyn et al. 2017). Thus, the shaming law may entail gender-specific behavioral responses if society applies different standards to non-compliance of women and men. Figure A.7 examines this possibility, by presenting the estimated effects of the shaming threat on tax debt for women and men separately. All estimated coefficients are virtually identical for the two sexes. These null differences suggest social costs of naming-and-shaming to be similar between sexes in our context.

In summary, we find the threat of shaming to cause an economically and statistically significant reduction of tax debt and of the probability of being in debt both for corporations and for the self-employed. That is,

taxpayers have been aware of the social norm of paying taxes on time but failed to comply. The large response to the threat of shaming is consistent with the interpretation that social pressure (and not peer comparisons) is the mechanism through which shaming policies affect behavior (Perez-Truglia and Troiano 2015). There is no heterogeneity between sexes but large heterogeneity in the effect across industries and corporations. The latter implies that the shaming policy has significant distributional effects. We take up this point when we discuss the welfare implications of the policy (Section 5). Before doing so, however, we estimate the impact of actual shaming in the next subsection.

### 4.2. Impact of Actual Shaming

The first shaming list published on the website of the tax administration on April 15, 2013 named-and-shamed 4,476 corporations (and 5,091 self-employed). Actual shaming may have reduced tax debt among shamed tax delinquents if it conveyed a stronger social norm or if the social costs of violating the norm were larger than anticipated. (Of course, it may have also increased such tax debt among previous compliers as we discuss in Section 5.)

As noted earlier, our analysis focuses on corporations (as we lack information on industry or comparable variables to determine the reference group for self-employed individuals). Figure 8 presents our results on how tax debt is causally affected by the first shaming list (published on April 15, 2013). The outcomes we consider are the relative change in tax debt (Panel (a)) and the probability of reducing tax debt by more than 5% (Panel (b)). We consider two-week periods during which taxpayers may respond: responses until the $25^{th}$ of a month and responses between the $26^{th}$ and the $9^{th}$ of the following month. The reason is that the shaming law sets strong incentives on the timing of the response of shamed tax delinquents. They can only avoid being named-and-shamed again on the ensuing list if they reduce their tax debts below €5,000 by the $25^{th}$ of the month. We find that actual shaming has an economically and statistically effect on tax debt of shamed tax delinquents immediately after the publication of the list. Among shamed tax delinquents the first shaming list: (i) reduces tax debt; (ii) increases the likelihood they reduce their tax debt by more than 5%; (iii) increases the likelihood they reduce their tax debt by more than 10% (unreported results). Table A.2 in the Appendix shows that all these results are qualitatively similar (although we somewhat lose statistical significance) if we control for industry growth, legal form, age, and size. However, Figure 8 also shows that actual shaming has a limited impact on tax debt over time. Indeed, the tax debt-reducing impact is confined to the first two weeks after the publication. In that time period, tax debt is reduced by 3.2%, which corresponds to additional tax revenue of €2.1 million.[36] Compared with the impact of the shaming

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[36]Total tax debt of the shamed corporations on April 15, 2013 amounted to €170 million. On average, 39.4% of non-shamed corporations improved their tax payment discipline. The impact of actual shaming on total tax debt is thus given by -0.032×0.394×€170==€2.1.

**Figure 8:** Effect of Actual Shaming Through Social Learning: Corporations

**(a)** Relative Change in Tax Debt

**(b)** Probability of Reducing Tax Debt by $> 5\%$
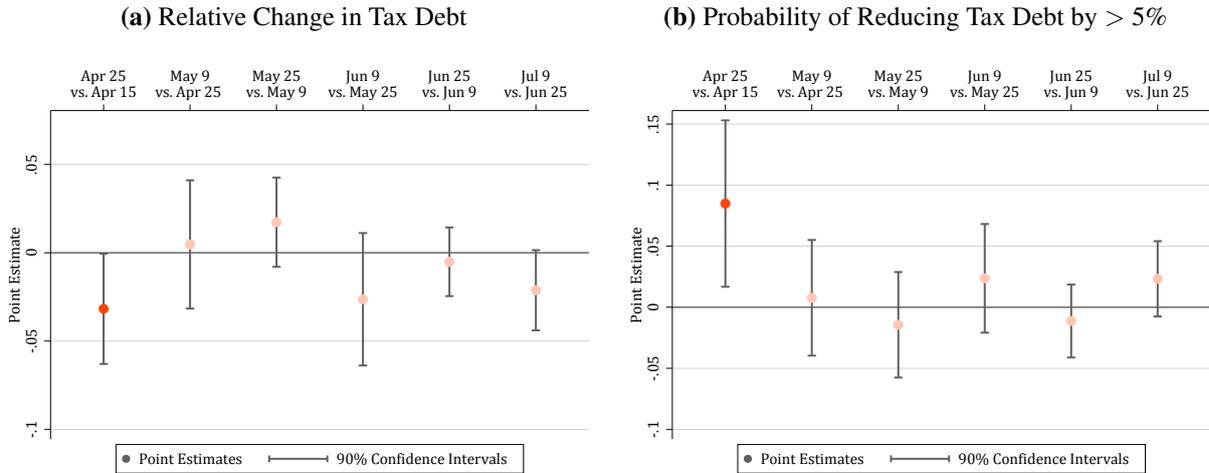


*Notes:* Robust standard errors are in parentheses. Social learning is measured by the share of taxpayers in the group whose relative reduction in tax debt after the publication of the shaming list is larger than before (or whose relative increase in tax debt is smaller than before), see equation (6). Social learning is calculated among non-shamed taxpayers to avoid endogeneity as explained in the main text, focusing on taxpayers with strictly positive tax debt both before shaming and on the publication date of the shaming list. Panel (a) displays the effects on tax debt and Panel (b) the effects on the probability of reducing tax debt by more than 5%. *Sample:* All corporations shamed on the first shaming list on April 15, 2013.

threat, the effects of actual shaming are thus modest. There are three reasons: (i) fewer taxpayers affected; (ii) smaller behavioral responses; (iii) short-lived impact. These findings have important implications for the optimal design of a shaming policy, as we discuss in the following section on the welfare consequences.

## 5. Welfare Implications

Our empirical findings show that the shaming policy significantly decreases tax debt.[37] However, the fact that it is effective and relatively cheap in equilibrium (Luttmer and Singhal 2014) does not necessarily imply that its use is recommendable in terms of social welfare.

First, paying tax debt shifts funds away from other uses. For instance, corporations may pay tax debt at the cost of paying the bills issued by private firms. In that case, the shaming law shifts the problem of outstanding debt from the public to the private sector. Further, to pay tax debt, corporations may postpone investment decisions, which in turn negatively affects growth prospects. As these examples show, the opportunity costs of the alternative uses of funds can be considerable. Whether the shaming policy is advisable therefore depends on the social benefit of the public goods provided with the additional tax revenue compared with the welfare loss from the foregone private use of funds.

Second, some tax delinquents may be unable to pay as opposed to simply unwilling. Indeed, increasing the costs of tax debt by public shaming aggravates the situation for taxpayers that are financially constrained.

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[37] Another advantage of shaming is that the threat already triggers behavioral responses (so that no penalties need to be imposed). In many other instances, only costly penalties trigger behavioral changes.

Shaming deteriorates their social reputation among customers and business partners; it further impedes access to external funding because of deteriorated business prospects and the perceived signal of payment difficulties. The shaming list also reveals this otherwise private information to the competitors of shamed corporations. As a result, company survival may be put at risk. The presence of taxpayers that are unwilling and unable to pay reveals a subtle trade-off for a social planner. The net benefit of the shaming policy depends not only on the magnitude of the treatment response among unwilling taxpayers but also on the underlying distribution of unwilling and unable taxpayers in the population.

Third, public shaming may increase tax evasion and tax avoidance. If taxes are more strictly collected, it pays off more to minimize taxable profits and thus taxes assessed. This will cause taxpayers to (legally and illegally) declare less and therefore pay less.

Fourth, public shaming might entail non-pecuniary costs. It violates a central feature of the tax system, namely the confidentiality of tax information. Public disclosure of tax delinquents may be at odds with the protection of personal data as a human right[38] and significantly alters the relationship between taxpayers and the tax administration.

Fifth, the disclosure of tax delinquents can have adverse effects on previously compliant taxpayers (see Blaufus et al. 2017; Doerrenberg and Peichl 2018, for evidence from the laboratory and from a randomized survey experiment, respectively). Compliant taxpayers may learn that the number of delinquent taxpayers and their amounts due are larger than they anticipated. The published information could then weaken the social norm of paying taxes on time (see Gino and Ariely (2009), who find unethical behavior to be contagious). To explore the effects of the shaming lists on previously compliant taxpayer, we again study the ratio between total payments made (payment stock) and total amount due (due stock)–this time for previous compliers with zero shaming probability. Figure 9 shows the payment-due-ratio for corporations (Panel (a)) and for self-employed individuals (Panel (b)) between July 1, 2012 and December 31, 2013. Before the publication of the first shaming list on April 15, 2013, the payment-due-ratio in both panels is larger than one almost always. For corporations, the payment-due-ratio is still above one after the first shaming list. That is, there is no evidence for contagion among corporations. For the self-employed, the payment-due-ratio may have slightly declined to values around one with the implementation of the shaming law. Naming-and-shaming may thus have slightly deteriorated tax payment discipline among the self-employed, if at all. We find very similar patterns for the corporations and the self-employed with strictly positive shaming probability below 20% (results unreported). While all these findings show that contagion is not an issue in our setting, they do not imply that contagion is a non-trivial issue in other settings.

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[38]For this reason and because of public stigmatization, the Information Commissioner of Slovenia filed a lawsuit against the shaming law. On March 10, 2016, the Constitutional Court of Slovenia decided the law to be legal (unanimous vote of 6:3).

**Figure 9:** Negligible Contagion Effects
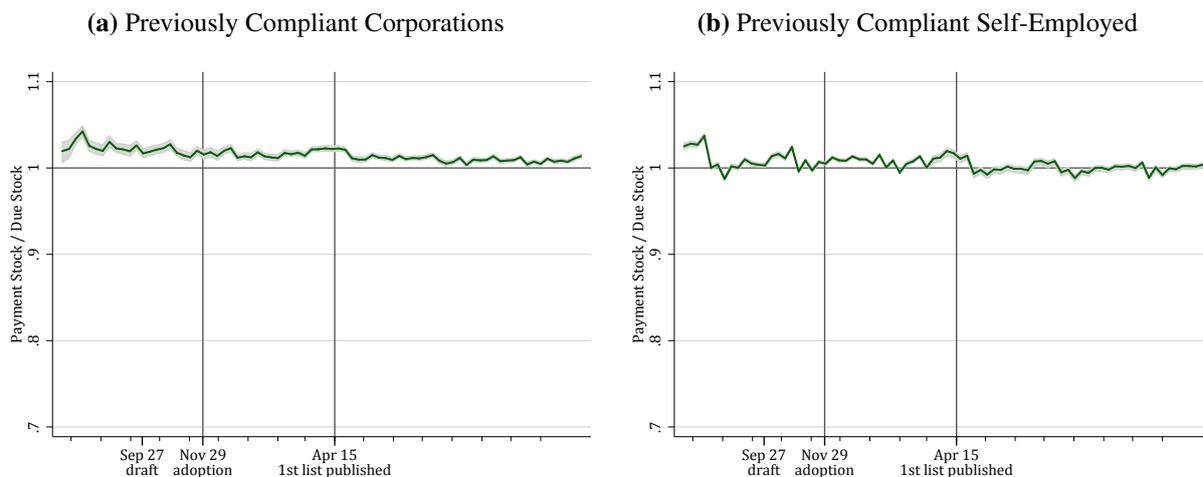
**(a)** Previously Compliant Corporations        **(b)** Previously Compliant Self-Employed



*Notes:* The figure displays the ratio between total payments made (payment stock) and total amount due (due stock, i.e. the sum of all tax items due) on a given date. Panel (a) refers to corporations and Panel (b) to self-employed individuals. The figure covers July 1, 2012 to December 31, 2013. The stocks are calculated for each date between July 1, 2012 and December 31, 2013. A ratio of 1 means that all tax items are paid on time. A ratio less than 1 means that a taxpayer accumulates tax debt. A ratio greater than 1 means that a taxpayer reduces tax debt or a previously compliant taxpayer makes tax payments before the due date. Grey areas depict the 95% confidence intervals (bootstrapped with 400 replications). *Sample:* All taxpayers with zero shaming probability.

Hence, should public shaming belong to the toolbox of public policy? The normative question raised by public shaming is complex. It involves the issues of efficiency, measurement of social benefits and costs, and choice of an appropriate social welfare function.[39] Naturally, the answer to whether shaming is advisable is context-specific. While we therefore refrain from advising for or against the use of shaming, we discuss four important issues on the optimal design of a shaming policy. First, the threat of shaming is effective and comes with fewer negative side effects than actual shaming. Thus, it is advisable to allow taxpayers to respond during a period of threat. This requires high visibility of the threat. For instance, a letter could warn all subjects with tax debt that they would be part of a shaming list. Second, the thresholds of the shaming policy need to be carefully designed. They determine both the effectiveness of the policy and its distributional effects. On the one hand, a low threshold amount may signal a strong social norm (as small tax debts are also socially unacceptable). On the other hand, a low threshold amount may imply that taxpayers with small tax debts are disproportionally affected by the policy (as the shaming penalty does not scale by

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[39]When choosing the social welfare function, one may consider Cowell (1990), who suggests reducing the social welfare weight for those that "are known to be antisocial" (1990, p.136).

the tax debt amount).[40] Third, shaming needs an audience. To keep the public interested and thus shaming effective, it is advisable to shame subjects intermittently. Fourth, public stigmatization is associated with significant pecuniary and non-pecuniary costs. If subjects change their behavior in response to the shaming, they should quickly be reintegrated into society. Therefore, it is recommended to immediately remove taxpayers with paid tax debt from the shaming list.

## 6. Conclusion

This study contributes to the mature literature on tax compliance and specifically to the emerging literature on the non-pecuniary motives for compliance (Luttmer and Singhal 2014). We present the first evidence from the field on whether and how the introduction of public shaming affects tax compliance behavior. Hence, we shed light on the importance of social pressure and social incentives for tax compliance, exploiting a large administrative tax data set on self-employed individuals and corporations in Slovenia.

While over half of US states and many tax authorities worldwide make ample use of public shaming as a penalty for non-compliance, empirical evidence on how a new shaming policy affects behavior is lacking. We make headway on this question by exploiting the unique aspects of our setting and data. In our setting, shaming is a new and highly visible policy. For the identification, we can thus exploit a large shift in social incentives in contrast to many earlier studies (Luttmer and Singhal 2014), and cleanly separate behavioral responses to the threat of shaming from those to actual shaming. Furthermore, our focus on tax debt and tax payments allows us to precisely measure the behavioral response to the shaming policy in the administrative tax data.

We conclude by highlighting two directions for future research. First, our finding that taxpayers significantly reduce their tax debt in response to the threat of shaming and less so in response to actual shaming suggests a need for more research to optimally design the policy. In particular, we need to understand how behavior changes with the amounts of tax debt that the shaming law brands as socially unacceptable as well as with the number of taxpayers shamed.

Second, more research is needed to better understand the mechanisms underlying the behavioral response. We have provided evidence that large corporations and taxpayers in industries selling to customers most strongly respond to the shaming policy. Are taxpayers signaling socially responsible behavior? Or are

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[40]Perez-Truglia and Troiano (2015) argue that the price of the penalty does not scale by the tax debt amount either. Therefore, taxpayers with large tax debts may be less willing to pay to be taken off the shaming list compared with taxpayers with smaller tax debt amounts. While Perez-Truglia and Troiano only find taxpayers with tax debt below $2,500 susceptible to shaming, we find that taxpayers from all ranges of tax debt respond to the newly introduced shaming policy. Apart from the obvious differences in the two countries studied, this difference may be driven by the size of the social incentive: Perez-Truglia and Troiano make an existing shaming policy more salient, whereas we study the introduction of a new shaming policy. In addition, the social costs of shaming potentially increase with tax debt in Slovenia as shamed tax delinquents are classified according to tax debt amounts (higher amount categories feature fewer taxpayers and receive larger public interest).

they trying to avoid unfavorable signals on financial health? More generally, are social image concerns hedonic or purely instrumental (Bursztyn and Jensen 2017)? Beyond establishing that social pressure is an important determinant of compliance behavior in this study, further research is needed to better describe the underlying determinants of shaming and social pressure.

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**Appendix**

**Figure A.1:** Shaming Policies are Widely Used to Enforce Taxes
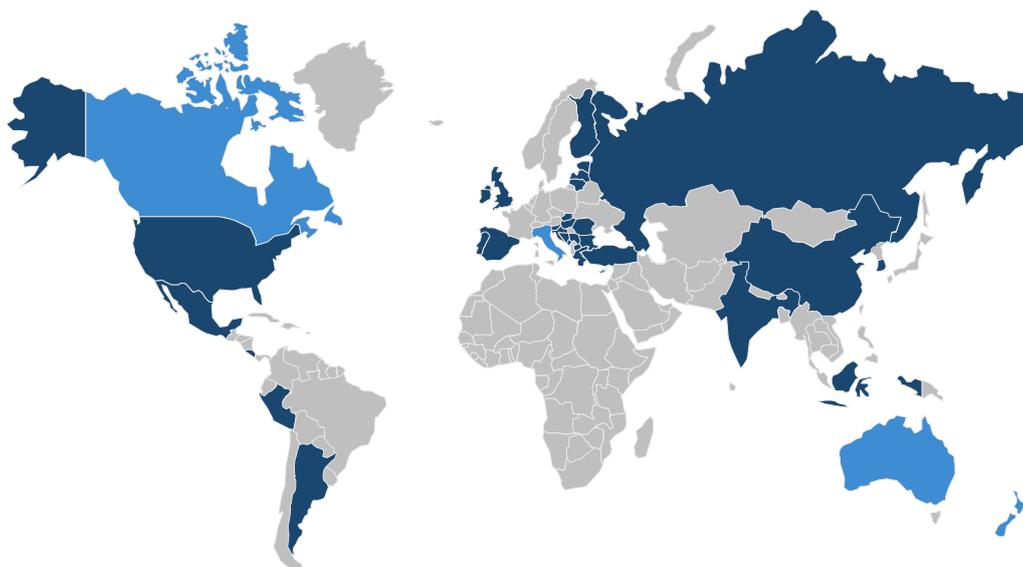


*Notes:* The areas shaded in dark blue depict countries that have shamed or still shame tax delinquents and/or tax evaders (OECD 2017; Perez-Truglia and Troiano 2015). While some countries shame taxpayers in newspapers or on the Internet, others employ unconventional shaming strategies such as sending drummers to the houses of delinquent taxpayers. The areas shaded in light blue depict countries that have the possibility to shame taxpayers (Cyprus, Malta) and countries that have not directly shamed taxpayers but have passed on taxpayer information to the local media.

**Figure A.2:** Shaming List Screenshot (Slovenian Original)



*Notes:* Screenshot of the Slovenian online shaming list. Source: `http://seznami.gov.si/DURS/main_neplacniki_po_abc.html`, accessed on January 1, 2018.

**Figure A.3:** Shaming List Screenshot (English Translation)



*Notes:* Screenshot of an English translation of the Slovenian online shaming list. Source: `http://seznami.gov.si/DURS/main_neplacniki_po_abc.html`, accessed on January 1, 2018.

**Figure A.4:** Distribution of the Shaming Probability
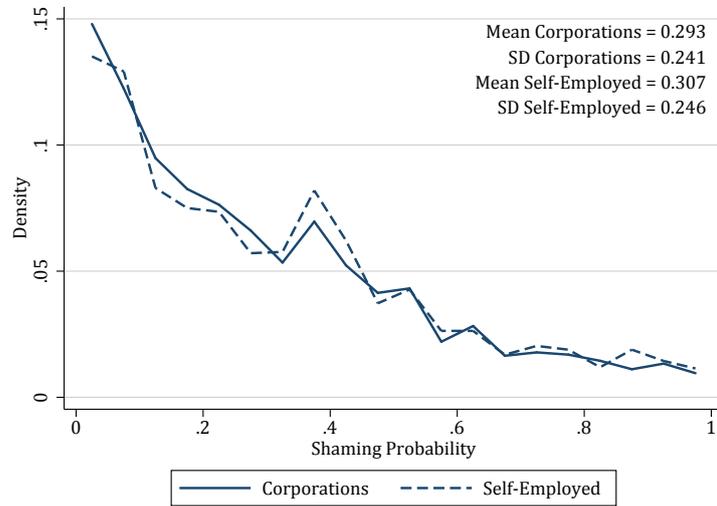


*Notes:* The figure displays the raw distribution of the shaming probability as defined in equation (1). The sample consists of all corporations with a shaming probability strictly above 0% and strictly below 100%.

**Figure A.5:** Weekly Due Tax Items (July 2012–December 2013)
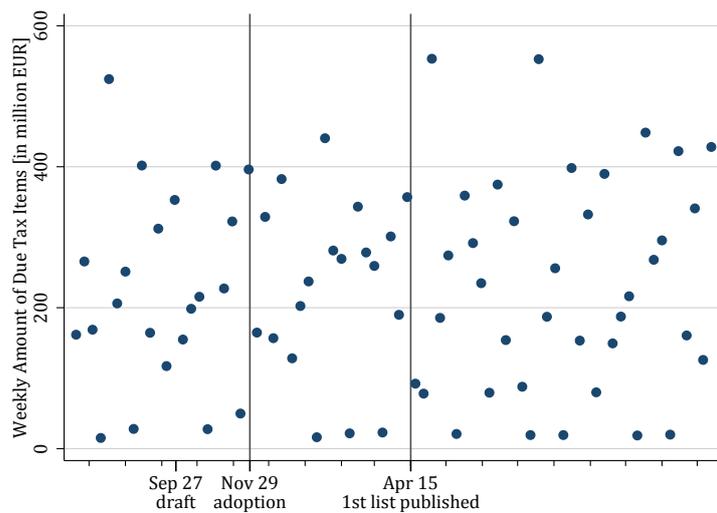


*Notes:* This figure plots the weekly sum of due tax items. The dashed lines represent the linearly fitted lines for the corresponding sections.

**Figure A.6:** Shaming Probability Correlation Graphs

**(a)** Corporation Size (Capital)



**(b)** Corporation Size (# Employees)



**(c)** Corporation Age (Years)
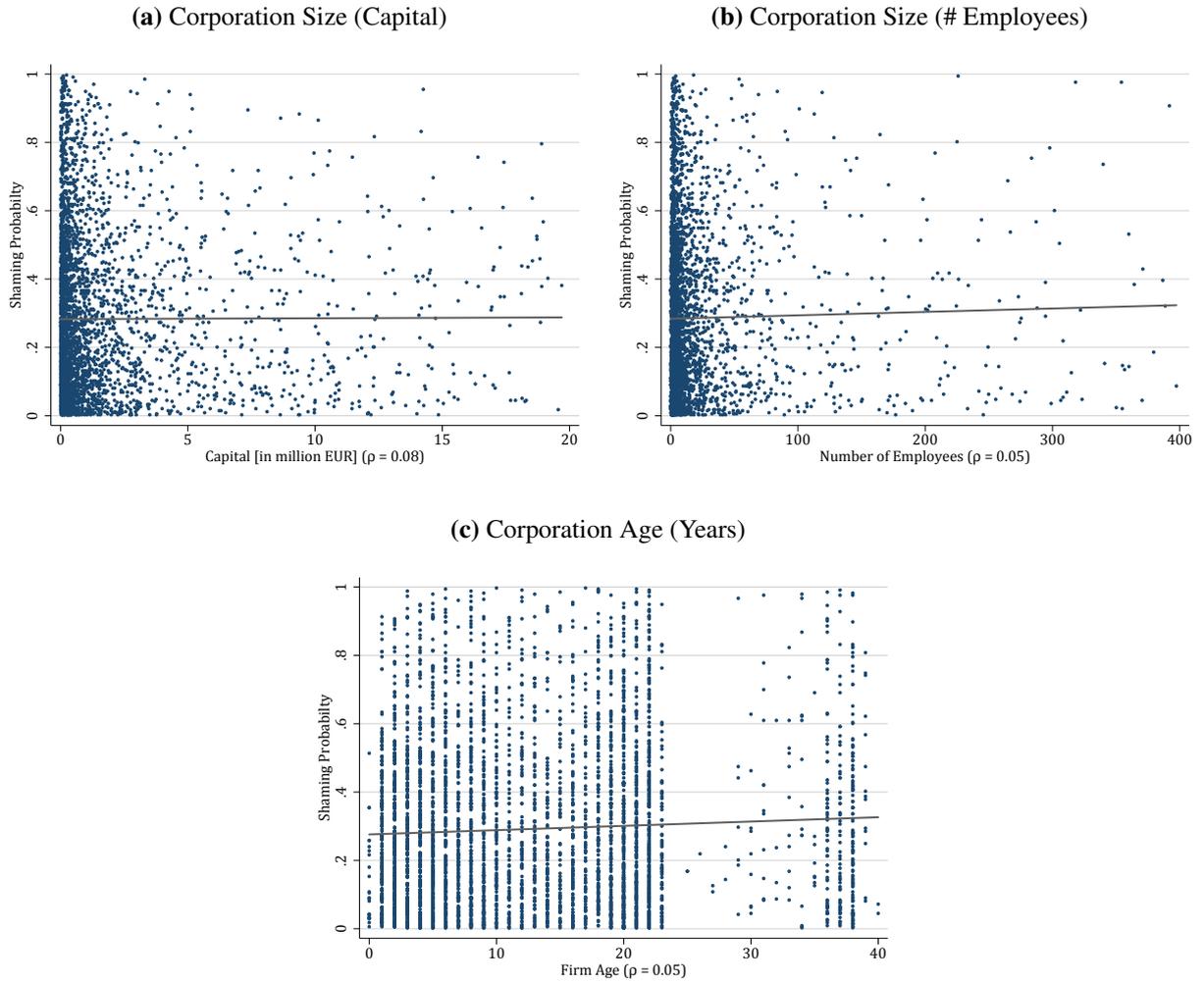


*Notes:* The figures show the correlation between the shaming probability and corporation characteristics. The graphical representations exclude observations with capital > 20,000,000 in Panel (a), number of employees > 400 in Panel (b), and age > 40 in Panel (c) due to scaling. The Pearson correlation coefficients $\rho$ are based on the full samples.

**Figure A.7:** Effect of the Shaming Threat: Female vs. Male Self-Employed Individuals
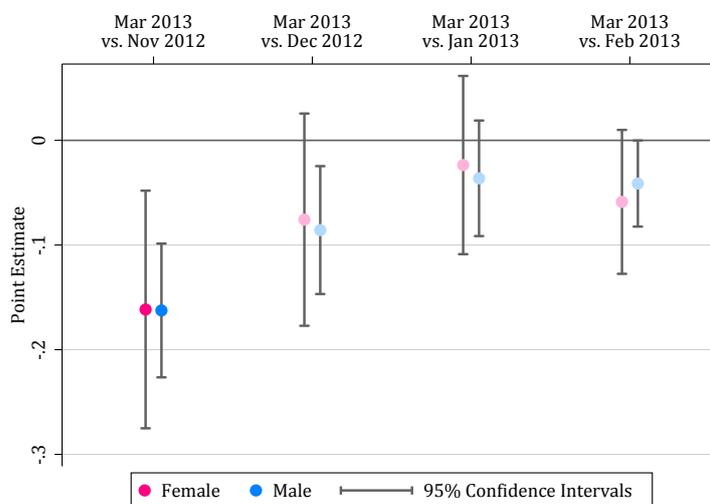


*Notes:* The figure displays the effect of the shaming threat on tax debt separately for women (pink dots) and men (blue dots). The estimation follows that in Figure 5, but differentiating between women and men. Tax debt refers to tax debt older than 90 days. The first dots (printed in bright pink and blue) show the coefficient for the full period of threat. The subsequent dots (printed in lighter pink and blue) show the corresponding coefficients by subperiod. The whiskers indicate the 95% confidence intervals (with robust standard errors).

**Table A.1:** Descriptive Statistics of Industry Heterogeneity: Corporations

| Industry | Industry Sector | Exporting Industry | # of Corp. |
|---|---|---|---|
| accommodation, food service activities | tertiary | no | 3,072 |
| activities of extraterritorial organisations and bodies | tertiary | no | 48 |
| administrative and support service activities | tertiary | no | 1,991 |
| agriculture, forestry, fishing | primary | yes | 819 |
| arts, entertainment, recreation | tertiary | yes | 3,244 |
| construction | primary | no | 8,607 |
| education | tertiary | no | 2,061 |
| electricity, gas, steam, air conditioning supply | secondary | yes | 701 |
| financial and insurance activities | tertiary | no | 1,286 |
| health, social work | tertiary | no | 1,776 |
| information, communication | tertiary | yes | 3,541 |
| manufacturing | secondary | yes | 7,647 |
| mining, quarrying | primary | yes | 75 |
| other service activities | tertiary | no | 5,982 |
| professional, scientific and technical activities | tertiary | yes | 13,133 |
| public administration, defence, [...] | tertiary | no | 1,616 |
| real estate | tertiary | no | 2,019 |
| transportation, storage | secondary | no | 4,094 |
| water supply, seweage, waste management, [...] | secondary | yes | 354 |
| wholesale, retail trade, repair of motor vehicles | tertiary | no | 15,512 |
| All | | | 77,578 |

*Notes:* Age, capital, and the number of employees are the mean values for corporations with non-missing values.

Sample: All corporations with a shaming probability below 100%.

**Table A.2:** Effect of the Actual Shaming on Tax Debt: Corporations

| | Apr 25 vs. Apr 15 | May 9 vs. Apr 15 | May 25 vs. Apr 15 | Jun 9 vs. Apr 15 | Jun 25 vs. Apr 15 | Jul 9 vs. Apr 15 |
|---|---|---|---|---|---|---|
| **Panel A: Dependent variable = $\%\Delta$tax debt$_{i,t}$** | | | | | | |
| No controls | $-0.032^*$ | $-0.027$ | $-0.010$ | $-0.036$ | $-0.041$ | $-0.062$ |
| | $(0.019)$ | $(0.029)$ | $(0.033)$ | $(0.039)$ | $(0.041)$ | $(0.044)$ |
| Control for industry growth | $-0.028^+$ | $-0.029$ | $-0.011$ | $-0.039$ | $-0.046$ | $-0.067^+$ |
| | $(0.018)$ | $(0.029)$ | $(0.033)$ | $(0.040)$ | $(0.041)$ | $(0.044)$ |
| Full set of controls | $-0.035^+$ | $-0.020$ | $0.008$ | $0.008$ | $-0.004$ | $-0.018$ |
| | $(0.024)$ | $(0.043)$ | $(0.049)$ | $(0.052)$ | $(0.056)$ | $(0.058)$ |
| **Panel B: Dependent variable = $\mathbb{1}\left[\%\Delta\text{tax debt}_{i,t} < -5\%\right]$** | | | | | | |
| No controls | $0.085^{**}$ | $0.093^{**}$ | $0.078^+$ | $0.102^*$ | $0.091^*$ | $0.114^{**}$ |
| | $(0.041)$ | $(0.043)$ | $(0.048)$ | $(0.054)$ | $(0.053)$ | $(0.055)$ |
| Control for industry growth | $0.080^*$ | $0.095^{**}$ | $0.079^*$ | $0.102^*$ | $0.093^*$ | $0.113^{**}$ |
| | $(0.041)$ | $(0.043)$ | $(0.048)$ | $(0.053)$ | $(0.053)$ | $(0.055)$ |
| Full set of controls | $0.096^+$ | $0.115^*$ | $0.076$ | $0.110$ | $0.093$ | $0.126^+$ |
| | $(0.065)$ | $(0.066)$ | $(0.074)$ | $(0.080)$ | $(0.079)$ | $(0.082)$ |

*Notes:* Robust standard errors in parentheses. Social learning is measured by the share of taxpayers in the group whose relative reduction in tax debt after the publication of the shaming list is larger than before (or whose relative increase in tax debt is smaller than before), see equation (6). Social learning is calculated among non-shamed taxpayers to avoid endogeneity as explained in the main text, focusing on taxpayers with strictly positive tax debt both before shaming and on the publication date of the shaming list. On average, 39.4% improve their tax payment discipline. $^{**}$ denotes significance at the 5% level, $^*$ at the 10% level, and $^+$ at the 15% level.
*Sample:* Corporations shamed on April 15, 2013.

# Online Appendix

**Figure OA.1:** Weekly Due Tax Items (July 2012–December 2013) by Shaming Probability Group

**(a)** Shaming probability ∈ (0,0.2]

**(b)** Shaming probability ∈ (0.2,0.4]

**(c)** Shaming probability ∈ (0.4,0.6]

**(d)** Shaming probability ∈ (0.6,0.8]

**(e)** Shaming probability ∈ (0.8,1)

**(f)** Shaming probability ∈ [1]
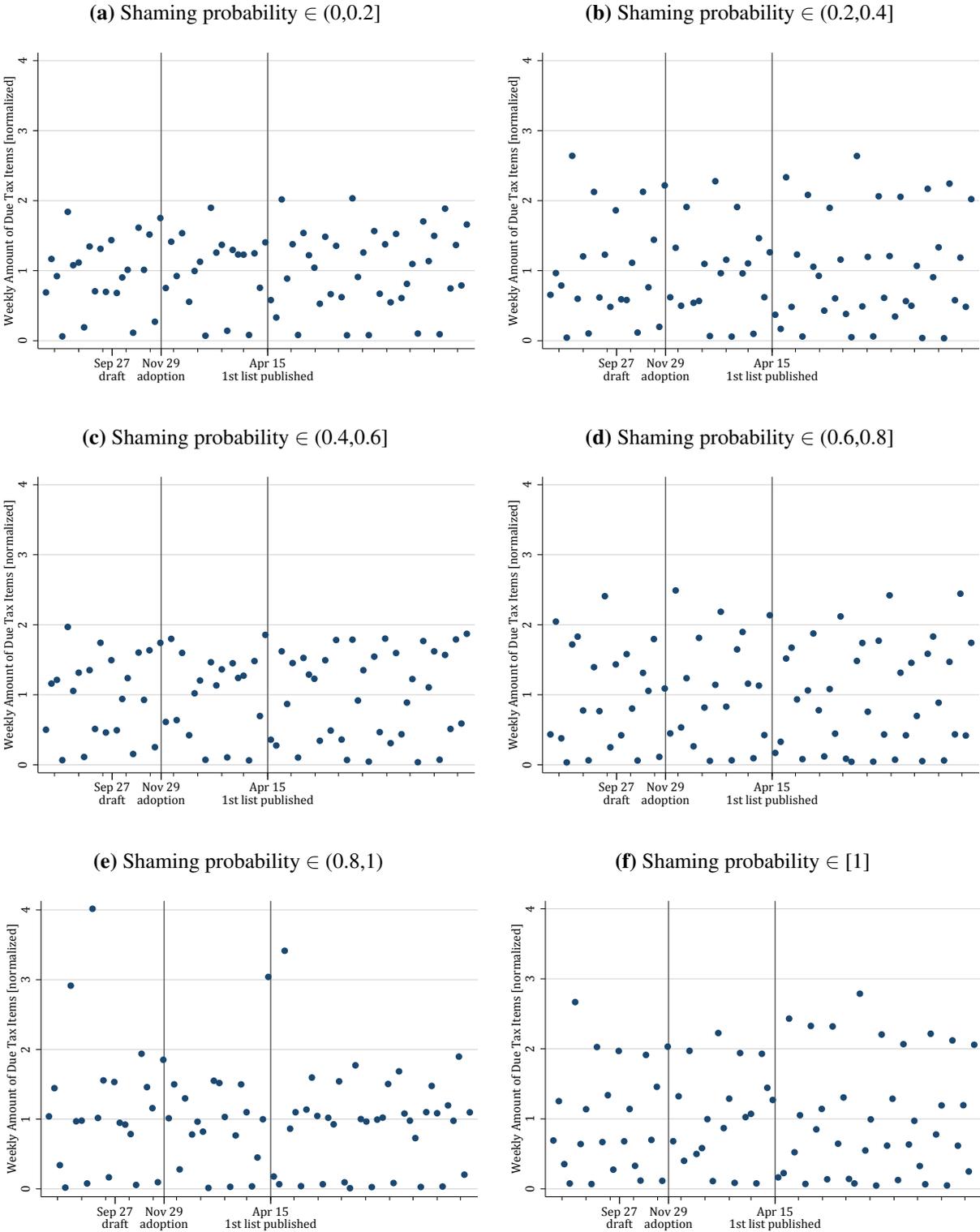


*Notes:* These figures plot the weekly sum of due tax items for different groups of corporations based on their shaming probability. The values are normalized by the mean value of weekly due tax items within each group. The dashed lines represent the linearly fitted lines for the corresponding sections.

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**Figure OA.2:** Weekly Due Tax Items (July 2012–December 2013) by Degree of Social Learning

**(a)** Social Learning Below the Median

**(b)** Social Learning Above the Median
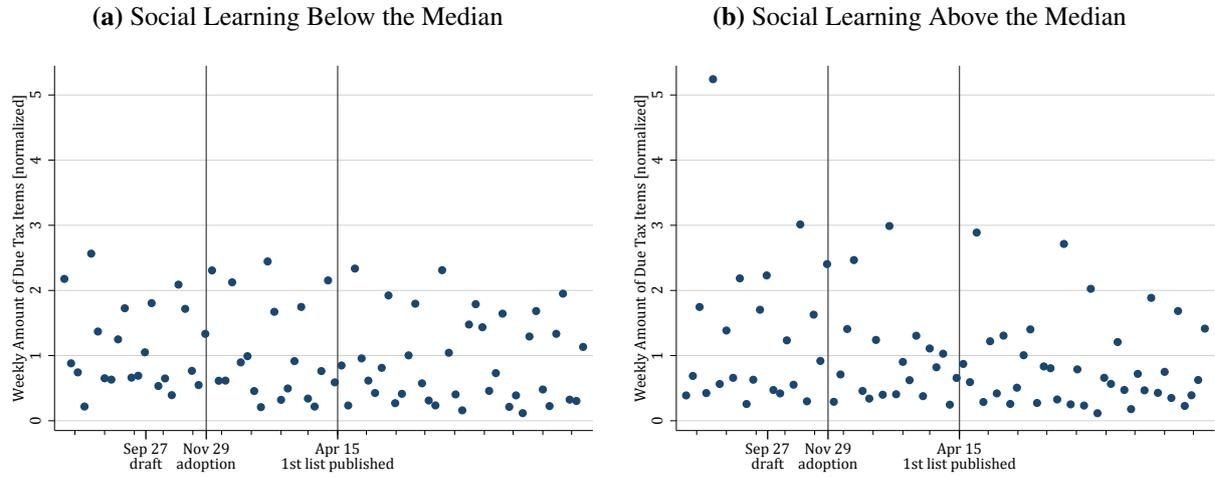


*Notes:* These figures plot the weekly sum of due tax items for corporations with degree of social learning below the median (Panel (a)) and above the median (Panel (b)). We calculate social learning among the non-shamed taxpayers according to equation (6). The weekly sum of due tax items is normalized by the mean value of weekly due tax items within each group. The dashed lines represent the linearly fitted lines for the corresponding sections.

**Figure OA.3:** Effect of the Shaming Threat: Corporations
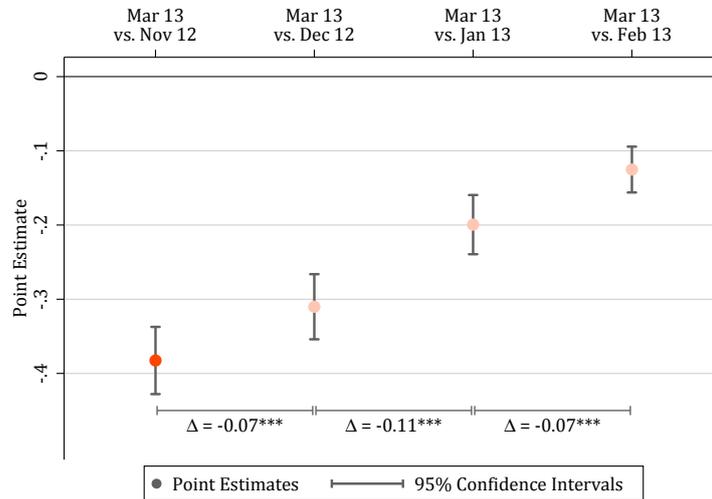


*Notes:* The figure displays the estimated effect of the shaming threat on tax debt, focusing on various time comparisons. Tax debt refers to tax debt older than 90 days. The coefficients are estimated as in column (1) in Table 2, but with the overall change in tax debt between the two indicated dates (instead of considering all monthly changes in between). The first dot (printed in bright orange) shows the coefficient for the full period of threat. The subsequent dots (printed in lighter orange) show the corresponding coefficients by subperiod. The whiskers indicate the 95% confidence intervals (with robust standard errors). Each of the Δ coefficients refers to a single month of the shaming threat. For instance, $\Delta = -0.07^{***}$ is the estimated coefficient for the first month of shaming threat, which is statistically different from zero at 1% level.

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