Norms, Enforcement, and Tax Evasion

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Abstract

This paper studies individual and social motives in tax evasion. We build a simple dynamic model that incorporates these motives and their interaction. The social motives underpin the role of norms and is the source of the dynamics that we study. Our empirical analysis exploits the adoption in 1990 of a poll tax to fund local government in the UK, which led to widespread evasion. The evidence is consistent with the model's main predictions on the dynamics of evasion.

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1 Introduction

Today's advanced economies could not sustain their size of government without a high capacity to tax. Such fiscal capacity is not just built on material motives (detection and punishment), however. In addition, it reflects individual intrinsic motives that curb the desire to cheat. When compliance is a norm, taxpayers may also worry about the social cost among their peers of being caught evading. But the interactions between material, intrinsic and social drivers of tax compliance are poorly understood. Policy-makers need to know the robustness of tax-compliance norms and whether social motives to comply erode or persist in the wake of compliance shocks. This paper looks as this question, theoretically and empirically.

Our key empirical contribution is to analyze the dynamics of tax evasion after Margaret Thatcher's government decided to fund UK local governments with a poll tax levied equally on all voting-age citizens in each local council. Historically, the UK has been a high-compliance society, but the poll tax triggered mass evasion to a point where it was a property-based tax was reintrdouced after only three years. We exploit the heterogenous breakdown of compliance across councils, and think about the poll-tax reform as an array of temporary shocks to the intrinsic motive to pay.[1] Evasion does diminish over time, but echo effects of high poll-tax non-compliance remain long after the tax was abolished. Beyond shedding light on the specific episode, our paper – to the best of our knowledge – is the first one to empirically study the dynamics of tax evasion in *any* context.

Our main theoretical contribution is a formalized model of evasion dynamics. Specifically, we build on Benabou and Tirole's (2011) model of laws and norms, assuming tax payers care about their reputation, should evasion be seen by others. We show how to extend their static model built on full observability, into a dynamic framework with imperfect observability. We do not assume *a priori* that social motives crowd in (complement), or crowd out (substitute), individual motives. But if paying taxes is the modal act

[1] A PhD thesis from Brunel University quotes the London borough of Ealing's local authority finance officers who referred to the cause of the non-compliance as being due to 'a developing non-payment culture among a significant cross section of the community' (Murgatroyd, 2000). Further support for the the interpretation of a shock to the inntrinic motives to pay is a mass campaign of protest from November 1989 onwards. The aim of this movement was to foster mass disobedience – e.g., one of its slogans was "Don't Register, Don't Pay, Don't Collect". In line with this, the official government archives released in 2017 https://www.theguardian.com/politics/2017/jul/20/unfair-uncollectable-how-major-told-thatcher-ditching-poll-tax suggest that the chief reason for the tax being abandoned was that it had become "uncollectible". This claim surfaced in a letter from John Major (the person who replaced Thatcher as Prime Minister) where he uses this phrase.

–as it is in our data –we get crowding in, and the difference equation for the time-path of evasion has a positive root, resulting in monotone convergence after a shock.

In this way, the theoretical and empirical contributions link up: a simple model based on evolving norms parsimoniously accounts for the evasion dynamics after the compliance shocks at the poll-tax episode.

The paper proceeds as follows.

Section 2 formulates our tax-compliance model. Individuals are motivated to comply by the threat of punishment (Allingham and Sandmo, 1972), intrinsic motivation (Gordon, 1989), and adherence to a social norm. That social images and peer pressures do influence behavior is confirmed in a range of field experiments reviewed in Burzstyn and Jensen (2017). In our model, compliance depends on the lagged population fraction of evaders, since evasion rates are plausibly observed – if at all – only with a lag. As a result, evasion follows a simple dynamic process, which converges to a steady state under natural conditions.

Section 3 applies the model to new data for tax evasion in the 346 councils of England and Wales for 30 years (1980-2009). This panel data shows that average tax evasion across councils before the poll tax was below 3 percent with little cross-sectional variance. The poll-tax period 1990-92 saw average evasion rise abruptly to between 10 and 15 percent. The large dispersion across councils can only partly be attributed to different demographic, economic and political compositions of councils. We interpret the conditional hikes in tax evasion as proxying for shocks to the intrinsic motives to pay. After the return to property-based taxes in 1993, average evasion returned only gradually towards pre-poll-tax levels. This time pattern squares well with persistent effects of temporary shocks to intrinsic motives, due to dynamically evolving social motives. Moreover, non-parametric estimates after the poll-tax period show clearly that evasion falls more slowly in councils with high evasion during the poll-tax period, just as the theory in Section 2 predicts.

This result does not reflect pre-trends in the data: high-evasion and low-evasion councils were very similar in trends and *levels* up to the year of the poll-tax shock. We discuss, and rule out, alternative explanations for the observed time patterns of evasion, including initial differences or (endogenous) dynamics in the fiscal capacities of high-evasion and low-evasion councils, government interventions in monitoring and enforcement, or political confounders. We also show that the decay patterns are robust to non-parametric controls for time-trends, and to the specific measurement of high versus low poll–tax

evasion.

2 Framework

2.1 Basic Model

Consider a council (peer group) with a continuum of agents of size (measure) one. Time is denoted by t. In each period, taxpayers must decide whether to comply or evade their taxes: $e_t \in \{0, 1\}$ with $e_t = 1$ denoting evasion.[2] All taxpayers have the same exogenous constant income y and tax liability x. As in Allingham-Sandmo, the material motive to pay m, is the expected cost of getting caught.

Taxpayers may also comply because of an intrinsic cost from evasion, with average level i_t. However, this cost varies across individuals, with a higher v_t denoting a greater proclivity to pay taxes. Idiosyncratic parameter v is thus positive or negative and we assume that it is drawn from a symmetric, unimodal distribution with unbounded support.[3] By definition, $E(v) = 0$, and we denote the p.d.f. and c.d.f. of the distribution by $g(v)$ and $G(v)$ respectively. We think about v as the taxpayer's *type.*

In general, we write the social component of individual preferences as $S(e_t, \lambda_{t-1})$ where λ_{t-1} is the share of individuals who evade at $t-1$.This assumes that average tax evasion is only observed with a lag, a plausible assumption as it takes time to audit tax payers, and take any tax evaders to court. In contrast to frameworks where individuals instantaneously find the long-run equilibrium, lagged observability induces the kind of adaptive behavior typical of evolutionary models, which is also typically found in lab experiments. The adaptive dynamics are crucial as they imply that social motives influence compliance with a lag.

Individual preferences Summarizing, the preferences of a type v taxpayer are:

$$u(v, e, \lambda) = y - [x + \mu S(0, \lambda)](1 - e) - [m + i + v + \mu S(1, \lambda)]\, e, \tag{1}$$

where weight μ parametrizes the weight on the social motive. This motive amounts to comparing the social-utility components $S(0, \lambda_{t-1})$ and $S(1, \lambda_{t-1})$ – evasion is thus

[2] A binary evasion decision fits our context, as nobody partially avoids their council tax.

[3] For example Helliwell (2003) reports a positive correlation between subjective levels of well-being and desires never to evade taxes.

influenced by the *relative social payoff*:

$$\Delta(\lambda) = S(0,\lambda) - S(1,\lambda).$$

How evasion affects the social motive hinges on whether $\Delta(\lambda)$ increases or decreases in λ. Before elaborating on this micro-foundation, however, we consider how equilibrium evasion evolves over time.

Equilibrium evasion Suppose observed evasion is λ_{t-1} and all other motives for evasion are constant over time. Then, an individual with intrinsic motivation v evades her tax *iff*

$$x + \mu S(0,\lambda_{t-1}) \geq i + m + v + \mu S(1,\lambda_{t-1}).$$

Individuals with v lower than the threshold defined by this expression will thus evade. Using the c.d.f. G, the equilibrium date t share of evaders follows the non-linear, first-order difference equation:

$$\lambda_t = G(M - \mu\Delta(\lambda_{t-1})), \tag{2}$$

where $M \equiv x - m - i$.

As in a standard model, higher material incentives to pay – such as greater enforcement m – reduces evasion, while a higher tax liability x increases it. Higher (average) intrinsic motivation to pay taxes i reduces evasion.

Equilibrium dynamics To explore the dynamics, consider a steady state defined by

$$\hat{\lambda} = G\left(M - \mu\Delta(\hat{\lambda})\right) \tag{3}$$

and a linear approximation around it

$$\lambda_t \simeq \hat{\lambda} + \alpha\left[\lambda_{t-1} - \hat{\lambda}\right].$$

Here, $\alpha = -g\left(M + \mu\Delta(\hat{\lambda})\right)\mu\Delta_\lambda(\hat{\lambda})$ is like a social multiplier, when evasion deviates from its steady-state value.

The sign of α can be positive or negative depending on whether individual evasion rates are strategic complements or substitutes, which correspond to $\Delta_\lambda \gtreqless 0$. In either case, we assume that $|\alpha| < 1$ so the steady-state is stable and a shock "corrects itself"

over time. Then, the difference equation has the standard solution

$$\lambda_t = \lambda_0 (\alpha)^t + \hat{\lambda} \left[1 - (\alpha)^t \right]. \tag{4}$$

From any initial value λ_0, the rate of evasion, λ_t, thus converges to the steady state $\hat{\lambda}$. If $\alpha < 0$, convergence is oscillating, whereas it is monotonic if $\alpha > 0$. While we could specify the sign of Δ_λ and α a priori, we will instead rely on a micro-founded model, based on Benabou and Tirole (2011).

2.2 Micro-founded Social Motives

Benabou and Tirole's (2011) model incorporates individual and social motives, where people care about their reputation for being pro-social. Suppose the prevailing social norm says that it is honorable to pay your taxes –i.e., to set $e = 0$. Because individuals with high v more likely pay their taxes, people get positive (negative) reputational utility from being perceived as a high-v (low-v) type.

Imperfect observability Invoking lagged observability of average compliance, we turn Benabou and Tirole's static model into a simple dynamic model. Given our application, we also relax perfect observability: it is plausible that a tax evader, $e = 1$, is imperfectly observed by the tax authorities and her peers. We capture this by a binary signal $\sigma \in \{1, \phi\}$, where 1 means being observed evading, while ϕ means not being observed. Let $\rho \in [0, 1]$ be the conditional probability of observing $\sigma = 1$ when $e = 1$. In general, we expect ρ to depend positively on m – as more resources raise the likelihood to observe and punishes evaders, and thus to publicly observe their evasion.

Thus there are no false positives: individuals can only be observed evading if they do. But there are false negatives: some individuals with low v-values are not observed to evade even though they do. Citizens take this imperfect observability into account in their inference about types.

Relative social payoffs To explore the micro-foundations further, define

$$E(0, \lambda) = \int_{G^{-1}(\lambda)}^{\infty} v \frac{dG(v)}{1 - \lambda} \text{ and } E(1, \lambda) = \int_{-\infty}^{G^{-1}(\lambda)} v \frac{dG(v)}{\lambda}$$

as the conditional (truncated) means of v, above and below the evasion cutoff defined by a particular fraction λ of evaders. Using Bayes' rule, let

$$Q^{\phi}(\lambda) = \frac{\lambda(1-\rho)}{1-\lambda\rho}$$

be the probability that an individual has $v \geq G^{-1}(\lambda)$, conditional on not observing evasion $\sigma = \phi$. Finally, define the expected value of v conditional on not observing evasion:

$$V^{\phi}(\lambda) = Q^{\phi}(\lambda) E(1,\lambda) + \left(1 - Q^{\phi}(\lambda)\right) E(0,\lambda).$$

Given these preliminaries, the social payoff associated with the two actions is:

$$S(e,\lambda) = \begin{cases} \rho E(1,\lambda) + (1-\rho) V^{\phi}(\lambda) & \text{if } e = 1 \\ V^{\phi}(\lambda) & \text{if } e = 0. \end{cases}$$

The relative social payoff defined in Subsection 2.1 becomes

$$\Delta(\lambda) = \rho\left(1 - Q^{\phi}(\lambda)\right)\delta(\lambda).$$

In the language of Benabou and Tirole (2011), $\delta(\lambda) = [E(0,\lambda) - E(1,\lambda)] > 0$ is "the honor of the pro-social choice less the stigma of the antisocial choice". This expression must be positive by definition of the truncated means of a mean-zero variable. But here, $\delta(\lambda)$ is "adjusted" for imperfect observability when $e = 1$.

Strategic complements or substitutes? To understand the sign and size of $\Delta_{\lambda}(\lambda)$, we inspect the sign of $\delta_{\lambda}(\lambda)$. As λ increases, both truncated means in the definition of $\delta(\lambda)$ go up, so the effect on the reputational term $\delta(\cdot)$ is generally ambiguous. To sign it, we draw on the results in Jewitt (2004). Single-peakedness and symmetry of density $g(\cdot)$ imply that $\delta(\lambda) = E(0,\lambda) - E(1,\lambda) > 0$ has a unique minimum at $\lambda = 1/2$. In our data, $\lambda < 1/2$ always: no council-year has evasion above 50 percent. In this region, $\delta_{\lambda}(\lambda) < 0$. Intuitively, when compliance is the modal choice, a higher number of evaders cuts the stigma of evading by more than it raises the honor of complying.

We can now sign the effect of an higher λ on the relative social payoff:

$$\Delta_{\lambda}(\lambda) = \rho\left[-\frac{\partial Q^{\phi}(\lambda)}{\partial\lambda}\left[E(0,\lambda) - E(1,\lambda)\right] + \left(1 - Q^{\phi}(\lambda)\right)\delta_{\lambda}(\lambda)\right]. \tag{5}$$

Since $Q^{\phi}(\lambda)$ is a fraction, the second term is negative as long as $\delta_{\lambda}(\lambda)$ is negative. As $E(0,\lambda) > E(1,\lambda)$, the sign of the first informational-effect term depends on:

$$\frac{\partial Q^{\phi}(\lambda)}{\partial \lambda} = \frac{(1-\rho)}{(1-\lambda\rho)^2} \geq 0.$$

In words, higher average evasion raises the probability that an individual not observed to cheat is an evader (the expression is zero with perfect observability, $\rho = 1$). Thus the first term in (5) is also negative.

To summarize, $\Delta_{\lambda}(\lambda) < 0$ when non-evasion is the modal choice. A higher population of evaders reduces the reputational utility from paying taxes – i.e., evading inflicts a negative externality on others. Therefore, individual evasion decisions become strategic complements. As a result, shifting individual motives that raise evasion – weaker intrinsic motives i or material enforcement m – are crowded in by social motives.[4]

Back to the general framework We can map these results into the equilibrium framework of Subsection 2.1. In particular, the root of difference equation (4) becomes:

$$\alpha = -\mu\Delta_{\lambda}(\hat{\lambda})g\left(M - \mu\Delta(\hat{\lambda})\right). \tag{6}$$

As we have seen, $\alpha > 0$ if the steady state $\hat{\lambda} = G\left(M - \mu\Delta(\hat{\lambda})\right) < 1/2$. Moreover, the root of the difference equation that governs the equilibrium evasion dynamics depends on the detection probability conditional on non-compliance and the signalling effect from taking the honorable compliance act.

2.3 Predictions

We apply the model to the evasion shifts triggered by the U.K. poll tax, introduced by the 1988 Local Government Act and implemented in 1990 (see further discussion in Section 3). Many taxpayers saw this tax as unfair, which reduced their intrinsic motives to pay.[5] But the poll tax was abolished in 1993 and replaced by a property-value based system akin to the one before 1990. Hence, the treatment period is 1990-1992. In the theory that follows, we treat these years as a single period.

[4]When a majority of people evade their taxes, we could instead get crowding out via a strategic-substitutes effect.

[5]This is consistent with the ideas in Cummings et al. (2009), who show a link between willingness to pay taxes and perceptions of governemnt quality. Evidence discussed in Hoffman et al. (2008) supports the idea that perceptions of tax fairness shape attitudes towards tax compliance.

The poll-tax shock Let $c = 1, ..., C$ index local councils that each begin in a steady state at $\hat{\lambda}_c$. At $t = 0$, each council experiences a negative poll-tax shock of size β_c and we order councils such that $\beta_1 < ... < \beta_C$. The shock is reversed at $t = 1$ and all parameters revert to their initial steady-state values. In the model, these shocks correspond to a negative downward shift of $i_{c,t}$, the average intrinsic motive to pay taxes.[6] Formally,

$$i_{c,t} = \begin{cases} i_c' < i_c \text{ for } t = 0. \\ i_c \text{ otherwise.} \end{cases} \tag{7}$$

We can define the $t = 0$ shock in c by

$$\beta_c = G\left(x_c - m_c - i_{c,0}^{'} - \mu\Delta(\hat{\lambda}_c)\right) - G\left(x_c - m_c - i_{c,0} - \mu\Delta(\hat{\lambda}_c)\right),$$

the period-0 hike in the fraction of evaders. Thus, observed average evasion at $t = 1$ including this impact effect becomes

$$\lambda_{c,0} = \hat{\lambda}_c + \beta_c.$$

Predicted impulse response Now, define α_c as the council-c value of α defined in (6). From (4), the time path following the shock at $t = 0$ is then given by

$$\lambda_{c,t} = \hat{\lambda}_c + \beta_c \left(\alpha_c\right)^t, \tag{8}$$

where α_c and β_c govern the council-c dynamics. The social motive to comply mediates the shock, unless $\mu = 0$. In that case, $\alpha_c = 0$ and we would see a downward jump at $t = 0$ when i_c falls, reversed by an upward jump to previous compliance already at $t = 1$. However, as $\mu > 0$ and $\alpha_c > 0$, the equilibrium dynamic adjustment is gradual.

Because the variation in tax evasion prior to the introduction of the poll-tax experiment was small (see Figure 1 below), we impose an approximate *common* starting value $\hat{\lambda}$ for tax evasion. Then, definition (6) implies that α_c is the same across councils.

We can summarize this discussion as follows:

Prediction *The impulse-response function for the share of tax evaders takes an upward jump to* $\hat{\lambda} + \beta_c$ *at* $t = 0$ *and falls monotonically back to* $\hat{\lambda}$ for $t > 0$. *Councils with higher* β_c *will have higher evasion than those with lower* β_c *throughout the dynamic adjustment.*

[6] A largely equivalent formulation would be to suppose that the shock to motives during the poll tax period results from a temporary change in the parameter μ as evasion becomes a virtuous act.

This prediction is useful to guide the empirical measurement and analysis in the next section. It attributes any differences in initial evasion after the shock to different values of β_c, which in turn reflect different values of $i'_{c,0} - i_{c,0}$. In reality, we will control for different economic, demographic, political, and social factors that impact the initial responses.

3 Evidence

3.1 Data

To confront the Prediction with data, we assembled a panel (from existing, but unexploited, sources) for council-wide tax evasion over 30 years (1980-2009) in each of the 346 councils in England and Wales.

Measuring tax evasion We calculate a measure of yearly average tax evasion for each council and year ($\lambda_{c,t}$ in the model) as the difference between net collected tax revenue and net tax liability ($x_{c,t}$ in the model) in council c and year t, expressed as a percentage of net liability in t. Doing this for the relevant tax base in each regime – i.e., 1980-89, 1990-92, and 1993-2009 (see further below) – we obtain our measure of evasion. Both collected revenue and liability are calculated net of outstanding arrears to purge our measure of any lagged evasion-related error component.[7] We can compare our evasion measure to evasion estimates based on administrative data-sets (from the Department for Communities and Local Government). In 2009, we get an average UK evasion at 2.69 percent, against 2.90 percent. Reassuringly, the correlation is 0.99 at the council-matched level.

Our data on evasion is based on digitized data-publications by the Chartered Institute for Public Finance and Accountancy (CIPFA). We obtain a sample of 8,220 council-year observations between 1980 and 2009.

A short primer on U.K. local taxation Throughout our sample period, the local council had responsibility for collecting taxes from households and businesses. Prior to the poll tax, local taxes known as 'rates' were levied on owners of domestic and business properties. In a system that went back to 1601, these rates were determined by the

[7]Both before 1990 and after 1993, tax liability was based on registry lists and property valuations. From 1990 to 1992, tax liability was calculated on the basis of on population registers. In all cases, tax liability can easily be calculated, making it straightforward to measure and track evasion.

rental value of a property. In 1990, the rates were abolished and replaced by a poll tax, formally known as the community charge. This was a flat-rate, per-head tax levied on any resident in a given council, regardless of their dwelling size, wealth and income, with very few exemptions and deductions. The poll tax proved controversial and was abolished in 1993. A new system (still in place) charged occupants – whether renters or owners – 'council taxes' for domestic properties and 'business rates' for non-domestic properties. This re-established a link between the tax liability and the property values, present before 1990 but absent during the poll-tax. More details on the different tax systems are in Appendix Section B.

Tax evasion across councils and time Figure 1 illustrates the distribution of tax evasion across time and councils. The left panel shows average evasion across councils for each sample year. Before the poll tax, this was just below 3 percent on a declining trend. The poll-tax period saw an abrupt upward shift, with average evasion reaching 10-15 percent. After 1993, evasion returned gradually towards pre-poll-tax levels. This pattern squares well with the idea that temporary shocks to intrinsic motives have persistent effects attributable to dynamics in social motives.

The right panel shows the density distribution across councils for selected sub-periods. The pre-1990 rates system saw relatively little dispersion around its 2.8 percent mean. In the poll-tax years, the large average evasion hike is accompanied by a huge increase in dispersion. As we will see in Subsection 3.2, large differences remain even as we adjust for a host of economic, social, and political variables. We interpret the mounting evasion dispersion as a set of heterogeneous shifts in such motives.

Figure 1 about here

In 1993-94 – right after the abolition of the poll tax – the evasion distribution shifts left with a significantly smaller spread. However, average evasion in these transition years is still 6.3 percent, more than double average pre-poll-tax evasion. During the remaining period (1995-2009), the distribution more closely resembles the pre-poll-tax distribution, but a higher mean as well as a larger spread suggest persistent evasion effects of the poll-tax shock.

3.2 Empirical Analysis

The prediction at the end of Section 2 says that councils with larger poll-tax evasion hikes should return more slowly towards pre-poll-tax evasion levels. Moreover, their evasion rate should stay above that in councils with smaller evasion hikes throughout the adjustment. Empirically, we calculate the initial shock to intrinsic motives by the rise in average (over time) council poll-tax evasion relative to average (over time and councils) evasion in the prior regime:

$$\beta_c = \lambda_{c,90-93} - \lambda_{80-89}.$$

Most of our empirical analysis rests on a *binary* classification of councils, based on their poll-tax shocks. But in Subsection 3.3, we also discuss – and show (in the Appendix) – results for a *continuous* measure of poll-tax evasion. To define the binary measure, let $\hat{c}$ be the median-shock council, β^L the average of β_c for $c < \hat{c}$, β^H the average of β_c for $c \geq \hat{c}$, and λ_t^J average evasion rate for group, $J = H, L$. In this notation, the dynamic model for the post-poll-tax years implies:

$$\lambda_t^H - \lambda_t^L = (\beta^H - \beta^L)(\alpha)^t. \tag{9}$$

Thus, the initial difference between the two groups decays over time. In principle, we could use the first year of the data to estimate $(\beta_H - \beta_L)$ and then estimate the social-multiplier, α, from the decay over time. However, if we find $\lambda_t^H - \lambda_t^L = (\beta^H - \beta^L)(\alpha)^t > 0$ for all $t > 0$ until some convergence year T, this is also evidence for $\alpha > 0$.

Heterogeneous evasion shifts Using (9), we confront the data with the key model prediction: $\lambda_t^H - \lambda_t^L$ is positive, but monotonically declining, from $t = 1993$ until some year T.

The left panel of Figure 2 plots the raw data for λ_t^H in red and λ_t^L in blue. The graph is striking. No systematic differences in tax evasion are visible in the decade before the poll-tax experiment. But after the poll tax, the share of non-tax compliers in the high poll-tax-evading councils lies everywhere above that in the low poll-tax-evading councils, with a monotonically declining difference. Evidently, some force slows down the adjustment process –in our model, that force is a gradually adjusting social motive.

Figure 2 about here

Conditional poll-tax evasion A legitimate concern is that council-specific shifts in poll-tax evasion need not only reflect variation in intrinsic compliance motives. For example, during the poll tax, tax-payers included renters, students and the unemployed, who were only to pay 20 percent of the poll tax. Local inequality in property values may thus have affected the sense of unfairness. We therefore condition on a number of local demographic and economic variables that may influence evasion in the poll-tax and subsequent periods.

Anger against the poll tax may also have had a significant political component. Although some opposition was spontaneous, the Labour Party organized protests. Moreover, councils ruled by Labour may have been more reluctant to aggressively enforce the "Thatcher" poll tax. Our model predicts that a certain amount of evasion, whether politically rooted or not, would be followed by similar dynamics. But persistently different political majorities may also have had different views on evasion in subsequent periods. To mitigate such simultaneity concerns, we condition on Labour and Conservative vote shares, as well as dummies for Labour and Conservative control.

Specification Specifically, let $\mathbf{y}_{c,t}$ be a vector of economic, demographic, and political characteristics, and estimate $\left\{\widehat{\gamma}, \widehat{\theta}\right\}$ from the OLS regression:

$$\lambda_{c,t} = \gamma + \mathbf{y}_{c,t}\theta + \varepsilon_{c,t}. \tag{10}$$

We then estimate (9), replacing $\lambda_{c,t}$ by $\tilde{\lambda}_{c,t} = \lambda_{c,t} - (\widehat{\gamma} + \mathbf{y}_{c,t}\widehat{\theta})$ – i.e., poll-tax evasion, conditional on observables. In terms of conditional tax evasion, (9) becomes

$$\tilde{\lambda}_t^H - \tilde{\lambda}_t^L = (\tilde{\beta}^H - \tilde{\beta}^L)(\alpha)^t,$$

where $\tilde{\beta}^J$ is calculated from: $\tilde{\beta}_c = \tilde{\lambda}_{c,90-93} - \lambda_{80-89}$.

Poll-tax evasion determinants Table 1 reports estimates from a short panel regression for poll-tax evasion, during the three relevant years, on a range of variables: the size of the poll-tax liability, the share of renters broken down by private and council landlords (a measure of new tax payers in the poll-tax regime), the ratio of houses in the top council-tax band and in the bottom band (a measure of housing-value inequality), (log) per-capita income, (log) population, seat shares of the Conservative and Labour parties, dummies for Conservative and Labour majority control in the council, and region and

year fixed effects.

Table 1 about here

The correlations in Table 1 make sense. Poll-tax evasion correlates positively with a higher poll-tax liability and negatively with higher income and greater housing-value inequality. We rely on the regression in the final column of Table 1 to construct our poll-tax evasion measure conditional on observable sources of cross-council heterogeneity. Using it makes more plausible our interpretation of the poll-tax evasion hike as a downward shift in the intrinsic motive for tax compliance. This approach to capturing intrinsic motivation – as the residual compliance after controlling for extrinsic factors – is a main method used in non-experimental settings where enforcement exists but is imperfect (Luttmer and Singhal, 2014).[8] Alternatively, tax morale has been studied in settings where enforcement is nonexistent, as in Dwenger, Kleven, Rasul, and Rincke (2016).[9]

Splitting the sample according to the (median of the) conditional-evasion measure, we obtain the right panel of Figure 2. Conditional evasion patterns are very similar to unconditional (raw) evasion patterns. Importantly, councils that differed in conditional-evasion had the same *levels* of evasion prior to the poll tax period. Thus differences in conditional evasion, which we interpret as shifts in intrinsic motives to pay, are not capturing unobserved cross-council heterogeneity in evasion motives (including enforcement capacity) prior to the poll-tax period. Any confounding cross-council heterogeneity must originate specifically during the poll-tax period and be orthogonal to the observable evasion determinants in Table 1.

Non-parametric estimates We examine the persistence of evasion by regressing evasion in the council-tax period on an indicator for high (above-median) conditional poll-tax evasion interacted with a full set of year dummies from 1993 to 2008 (2009 is the left-out indicator). In effect, we estimate separate year effects for the two sub-groups in the right graph of Figure 2. Since we include council fixed effects, year fixed effects, and region-by-year fixed effects, we capture a plethora of fixed socio-demographic factors and general trends, which are likely to affect evasion and thereby capture the 'normal'

[8] In the context of households, our measure of intrinsic motivation is unlikely to be confounded by private pecuniary benefits. Such motives are more likely to be important for firms - per example if compliance permits access to formal credit and public procurement markets.

[9] Other studies shed indirect light on tax morale by examining compliance of taxpayers that face the same enforcement environment but differ in observable characteristics associated with morale, including (DeBacker, Heim, and Tran, 2012).

value of $i_{c,t}$.

Figure 3 shows that all year dummies for high conditional poll-tax evasion councils are significantly different from zero between 1993 and 2002. This suggests a persistent echo effect on evasion up to ten years after the poll tax is abolished.

Figure 3 about here

3.3 Robustness

The results in Figures 2 and 3 are consistent with the model predictions, which reflect a gradual adjustment over time of the social motives for tax compliance.

Pre-trends? If the poll tax disrupted a tax-paying social norm, we should see no pattern like the left panel of Figure 3 in the period before the introduction of the poll tax. Observing a similar pattern would be like a violated assumption of parallel pre-trends in a difference-in-differences estimation. The right graph in Figure 3 shows that councils with high and low conditional poll-tax evasion were on parallel trends in 1980-1989. In other words, the cross-council heterogeneity in evasion emerged with the introduction of the poll tax and not in the decade before.

Tax-response confounders? To look for confounders, we first ask whether tax rates responded with local authorities trying to claw back lost tax revenues. The top-left panel of Figure 4 shows this not to be the case, as the *tax liability per dwelling* has the same time path in high and low poll-tax evasion councils.

Enforcement-intensity confounders? The top-right panel of the figure rules out a differential response in *enforcement effort*. It shows that the two sets of councils have the same ratio between the number of court summons for non-payment of taxes and the number of reminders for non-payment. This is a plausible proxy for enforcement intensity.[10] [11]

[10] In Appendix Section A, we show theoretically that – under reasonable assumptions – endogenous enforcement responses will lead us to understate the evasion patterns caused by a temporary shift in the intrinsic motives.

[11] We can also show (results not displayed) that directly including controls for remaining evasion determinants (tax liability, log income, housing stock and inequality) does not alter our main results on the dynamics of tax evasion.

Political confounders? We have already adjusted our measure of conditional poll-tax evasion for relative Conservative-Labour strength. The results in Table 1 show that councils controlled by Labour had significantly higher tax evasion during poll-tax years. If this reflects a lower willingness to enforce the poll tax, the results in Figure 3 might capture a gradual increase of enforcement in those councils.

To assess this possibility, we include a poll-tax-Labour-control dummy interacted with year effects in the earlier specification. If initially low and gradually increasing enforcement in councils controlled by Labour during the poll-tax period were the explanation for the results in Figure 3, then the new variable should weaken or kill the results. The bottom-left panel of Figure 4 shows that this is not the case.

Figure 4 about here

Fiscal-capacity confounders? Another alternative explanation for the results in Figure 3 is that high versus low poll-tax evasion reflected the capacities to enforce the new tax system, rather than a larger drop in the intrinsic motives to comply. To rule this out, we exploit the fact that local councils also collect business taxes. If *local fiscal capacity* were the real culprit, then we should see a similar evolution of evasion in the part of local taxes levied on businesses rather than households. The bottom-right panel of Figure 4, shows no evidence of different business tax evasion-dynamics across high versus low conditional poll-tax evasion councils.

Other types of trends? Our main result was estimated in a model which included region-by-year fixed effects. In Appendix Figure A.1, we show that the result is virtually unchanged when adding Labour control-by-year and property types-by-year, or when removing all these interactive fixed effects. This suggests that the differential decay pattern is not driven by specific (non-parametric) time-trends in subsets of councils in either the high or the low conditional-evasion groups.

Alternative measurements of poll-tax evasion? We can show that our main results do not hinge on the specific measurement of the poll-tax evasion shocks. In Appendix Figure A.2), we show the same estimates as in Appendix Figure A.1, when we use *unconditional*, rather than *conditional*, tax evasion to classify councils into high versus low poll-tax-evasion. The estimates are similar, albeit less precise. Our main result therefore

does not reflect the particular extrinsic factors used to explain variation during the poll-tax period.

In addition, we have run similar specifications with a *continuous*, rather than *binary*, measure of poll-tax evasion, perhaps the most literal prediction of the theory. That is, we estimate a version of (8) rather than (9). We do so both for unconditional and conditional evasion. Appendix Figures A.3 and A.4 show that the point estimates are similar but less precise than the estimates with the binary measure in Appendix Figures A.2 and A.1.

Finally, we can define average pre-poll-tax evasion over a *shorter benchmark period* of three years (same as the poll-tax period), namely 1987-89 rather than 1980-89. The results – for conditional and unconditional continuous evasion – in Appendix Figures A.5 and A.6) are similar to those reported in Appendix Figures A.3 and A.4 for the longer benchmark period.

Bottom line The findings in this subsection suggest that our main results in Figure 3 do not reflect pre-trends. Neither are they explained by different tax responses, enforcement efforts, or general tax capacities across councils, differences which are gradually eliminated over time. The findings on political control suggest the observed dynamics do not reflect political changes provoked by the fall-out from the poll tax. This is important, as a raft of policy differences could be affected by political control and confound our main findings. The estimates based on alternative measurements suggest that the main results are not tied to a specific way of defining the poll-tax evasion shock. The results in this subsection do not prove that the observed evasion dynamics mirror gradually shifting norms following a compliance shock. But taken together, they make it plausible to interpret the data in that way.

4 Conclusion

This paper studies the dynamics of tax compliance. Theoretically, we do so by applying and extending the model of Benabou and Tirole (2011), a model that highlights the interaction between social and private motives for evasion. We extend their static model with full-observability to include dynamics with imperfect observability. Empirically, we study the dynamics of evasion based on a unique temporary policy shock: the introduction and abolition of a poll tax in English and Welsh councils during the government of Margaret Thatcher. This natural experiment allows us to study tax compliance in

a previously law-abiding environment, which is temporarily exposed to much greater evasion than could ever be imagined in any kind of feasible field experiment.

The empirical results are consistent with our theoretical predictions. They suggest that the poll tax shifted the intrinsic motive to pay, that these shifts spilled over into social motives, and that the shifts exerted a significant but declining effect on tax evasion for around a decade. Although we cannot rule out all other interpretations, we find no evidence that our results reflect pre-trends, other trends, fiscal-policy confounders or fiscal capacity, political confounders, or our specific measurement.

We can quantify the total amount of evasion due to the poll-tax shock by using average pre-poll-tax tax evasion rate as a counterfactual. We compute actual evasion minus counterfactual evasion from 1990 onwards, multiplied by each council's tax liability. Aggregating over councils and years, the cumulative tax loss is between 3.94 and 5.46 billion 2009 pounds (21 to 29 percent of the aggregate 2009 council-tax liability), depending on whether we gauge counterfactual evasion in 1980-89 or 1987-89. Roughly, half the loss reflects the poll-tax period itself. The other half reflects the post-abolition period, a weighty "echo effect" on subsequent tax revenue.

While the context is specific, our results reinforce the idea that social motives may be an important part of state capacity, facilitating the task of raising revenue. The UK system proved robust to the short-lived poll-tax episode. As emphasized by Levi (1988) and other commentators, however, norms are built over long periods and policy-makers violate them at their peril.

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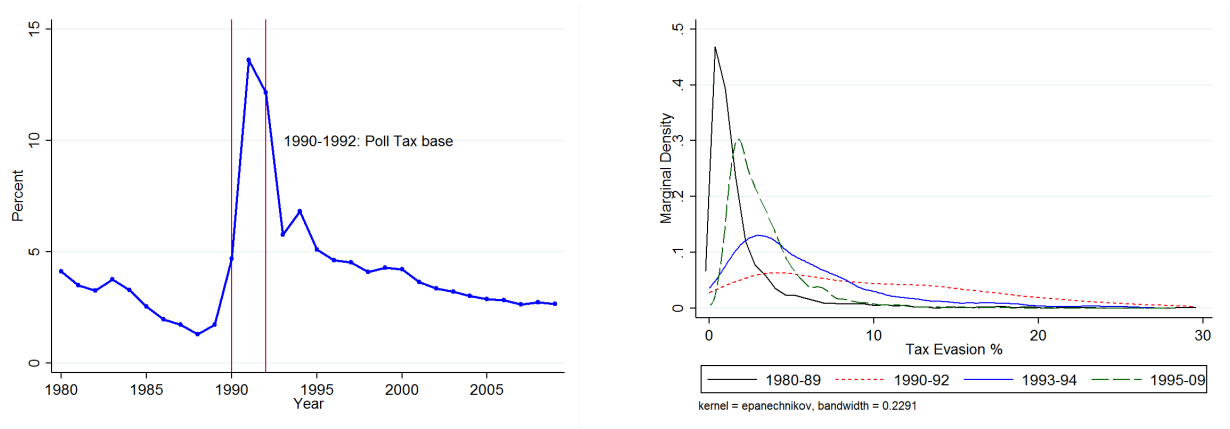
Table 1

	(1)	(2)	(3)	(4)	(5)
	Poll Tax Evasion = [Net Collectable - Net Collected]/[Net Collectable]				
Poll Tax Liability	.0285	.0283	.0287	.0240	.0245
	(.0059)	(.0060)	(.0062)	(.0061)	(.0061)
Log (per capita income)		-8.7395	-9.9374	-5.8293	.2652
		(4.2970)	(4.6981)	(4.9016)	(5.9762)
Log (population)			-.3425	-.8100	-.7249
			(.5905)	(.5200)	(.6215)
Conservative Seat Share				-.0144	-.0185
				(.0193)	(.0236)
Conservative Control				.4824	1.0993
				(.9176)	(1.0369)
Labour Seat Share				-.0107	.0105
				(.0207)	(.0210)
Labour Control				3.7423	3.9873
				(.9494)	(.9780)
(Top Band Houses)/(Bottom Band Houses)					-.1703
					(.0732)
Share Households Renting from Private					34.6561
					(9.0165)
Share Households Renting from Council					-6.9202
					(2.3311)
Year Dummies	Yes	Yes	Yes	Yes	Yes
Region Dummies	Yes	Yes	Yes	Yes	Yes
Observations	684	684	684	684	619

Notes: This table reports estimates of a cross-council regression for poll-tax evasion, corresponding to equation (10). The sample includes all council-year observations during the poll-tax era, which lasted from 1990 to 1992. All regressions include year fixed effects and region fixed effects. Across columns, additional controls are included: the size of the poll-tax liability, log per capita income, log population, the seat shars of the Conservative and Labour parties, as well as dummies for Conservative and Labour majority control in the council, the proportion of houses in top-council tax band compared to bottom band, and the share of renters broken down by private and council landlords. Robust standard errors reported in parentheses. The conditional poll-tax evasion measure is calculated as the residual evasion after controlling for the observable factors in column (5). For more details on the construction of this measure, please refer to Section 3.2.

Figure 1

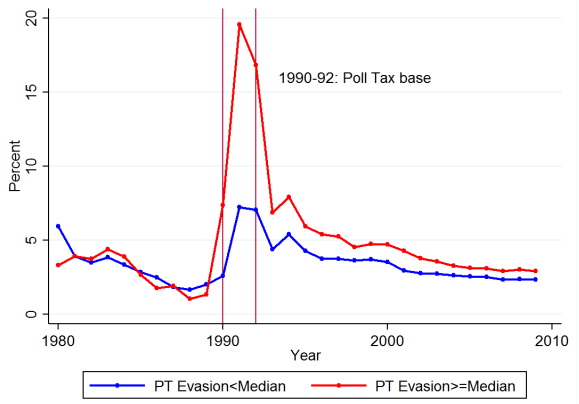
(a) (b)



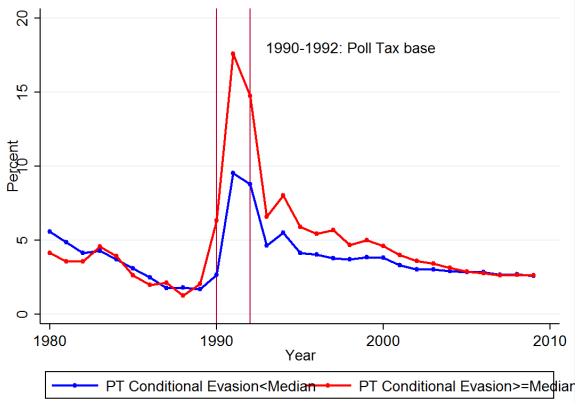
Notes: In the left graph, each observation is a yearly average across all councils of our tax evasion measure, the difference between net collected tax revenue and net tax liability on the local tax base. During 1990-1992, a property tax was replaced by the poll tax, which was levied at a flat rate per head. The right graph plots the marginal density distribution of tax evasion across four time-periods: 1980-1989 (Domestic Rates tax base); 1990-1992 (Poll Tax base); 1993-1994 (first 2 years of Council Tax base); 1995-2009 (remaining years of Council Tax base). Tax evasion is truncated at 30%, which equals the 99^{th} percentile for all time-periods (for 1995-2009, it equals the 99.99^{th} percentile).

Figure 2

(a)



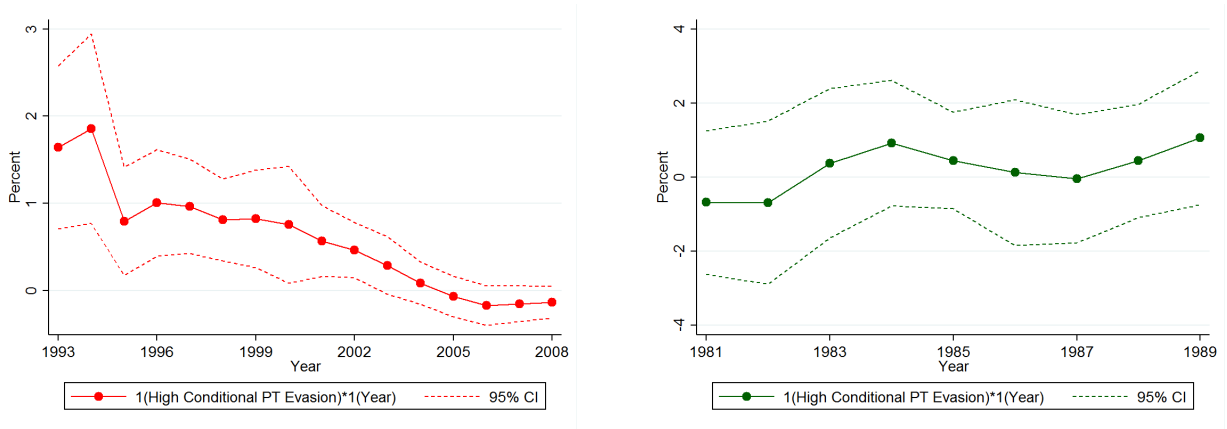
(b)



Notes: Each yearly observation in the left (right) graph is an average of tax evasion across all councils in one of two subsamples. The blue line refers to councils where average unconditional tax evasion (average conditional tax evasion) in the poll-tax period, relative to the average evasion on domestic rates, was below the median. The red line refers to councils where average unconditional tax evasion (average conditional tax evasion) was above the median. Section 3.2 and Table 1 give more details on the construction of conditional poll tax evasion.

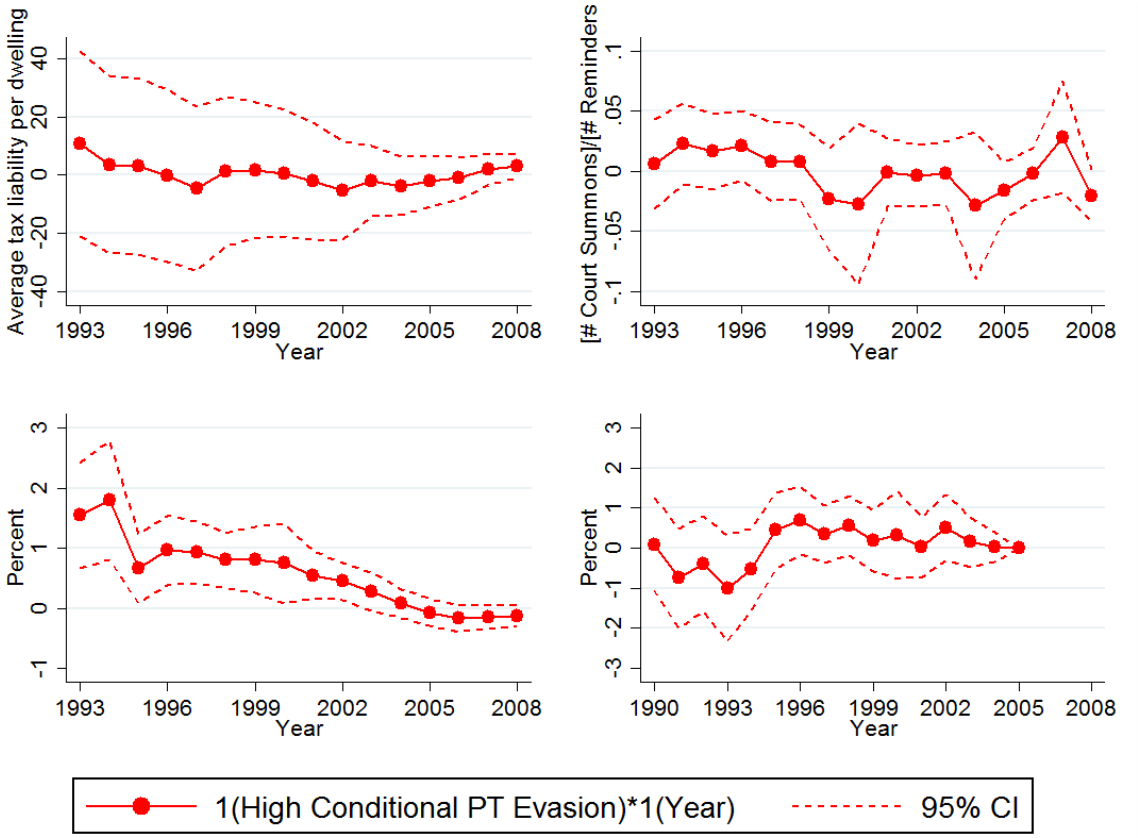
Figure 3

(a) (b)



Notes: The left graph is derived from a regression of tax evasion, which includes a set of year fixed effects, a set of council fixed effects, and a set of region-by-year fixed effects. Each red dot marks the estimated coefficient on the corresponding year dummy interacted with a dummy for conditional Poll-Tax evasion (net of average Domestic-Rates evasion 1980-89) above the median. The sample period is 1993-2009, which corresponds to the Council-Tax period (2009 is the omitted year). The right graph plots the analogous coefficients, for the same specification as the left graph, but where tax evasion now refers to the Domestic-Rates base during 1980-89 (1980 is the omitted year). In both graphs, dashed lines mark 95-percent confidence intervals on the interaction term, where standard errors are clustered at the council level. Section 3.2 and Table 1 give more details on the construction of conditional poll-tax evasion.

Figure 4



Notes: The top-left and top-right graphs are based on the same specifications as Figure 3. But the outcome variables are the average Council-Tax liability per dwelling, and the ratio of summons to of reminders (proxy for enforcement intensity), respectively. The bottom-left graph is based on the same specification as Figure 3, except that it also includes year-dummies interacted with a binary indicator for Labour-party control of the council in any year of the Poll-Tax period (1990-1992). The bottom-right graph is based on the same specification as Figure 3, but the outcome variable is now evasion on the Business Rate (a local tax paid by firms rather than households). In this graph, the sample period is 1990-2005 (and 2005 the omitted year).

Appendix

A Endogenous Enforcement

Our empirical explanation relies on there being no systematic (non-political) response of tax enforcement to the poll-tax. Formally, our model prediction assumes a constant exogenous level of tax enforcement m, despite increased evasion. However, given the nature of the poll-tax episode, it is reasonable to suppose that tax authorities might have taken steps to recoup lost revenues. In this section, we investigate this possibility theoretically (Subsection A.1), as well as empirically (Subsection A.2). We show that our earlier results still stand under reasonable assumptions. In particular, we can rule out that the shrinking evasion difference between high poll-tax-evasion councils and low poll-tax-evasion councils is driven by gradually stricter enforcement in the high poll-tax-evasion councils.

A.1 Theory

When exploring the implications of endogenous enforcement, we will postulate a policy rule where enforcement depends on the level of non-compliance. To motivate this, note that the revenue raised by council c in year t is given by

$$r_{c,t} = (1 - \lambda_{c,t}) x_{c,t} \, . \tag{11}$$

Now define:

$$\hat{m}\left(x, \theta, i, \lambda_{t-1}\right) = \arg\max_{m} \left\{ \left[1 - G\left(x - i - m - \mu\Delta\left(\lambda_{t-1}\right)\right)\right] x - c\left(m, \theta\right) \right\},$$

where $c\left(\cdot, \theta\right)$ is an increasing convex cost function. Variable θ captures (time-varying) factors which shape the costs and benefits of enforcement. We use the convention that $c\left(m, \cdot\right)$ is increasing with $c_{m\theta}\left(m, \theta\right) > 0$, so that higher θ is associated with higher costs of enforcement. The first-order condition is then

$$g\left(x - i - m - \mu\Delta\left(\lambda_{t-1}\right)\right) x = c_m\left(m, \theta\right). \tag{12}$$

Comparative statics This gives the following comparative statics

Result *With $\lambda < 1/2$, optimal enforcement m is increasing in x* and *λ_{t-1}, and decreasing in i*

and θ. *Moreover, if* $z = i + \mu\Delta(\lambda_{t-1})$, *then* $\partial\hat{m}/\partial z > -1$.

These results make sense. Tax authorities have a higher marginal gain to enforcement when taxes are higher. When intrinsic motivations to pay are higher, optimal material enforcement is lower. As a high level of historical enforcement encourages compliance, it reduces formal enforcement. The final result relies on

$$\frac{\partial m}{\partial z} = -\frac{g'(x-m-z)}{g'(x-m-z) + c_{mm}(m,\theta)} > -1,$$

since for $\lambda < 1/2$, the density is increasing. Factors in θ which increase the marginal cost, or reduce the marginal benefit, to investing in enforcement reduce investments in formal enforcement. More generally, optimal enforcement depends on the slope of the marginal cost curve. In the short-run, when it is difficult to expand the size of an enforcement department or to ratchet up the enforcement process, this function could be quite steep, and we would expect only modest enforcement responses to the poll tax shock.

A policy rule To integrate these insights into the model, we propose a policy rule based on a linear approximation to (12):

$$\hat{m}(x_{c,t}, \theta_{c,t}, i_{c,t}, \lambda_{c,t-1}) = \xi x_{c,t} - \tau i_{c,t} - \chi\theta_{c,t} - \sigma\mu\Delta(\lambda_{c,t-1})$$

where $\xi, \chi > 0$, $1 > \tau > 0$ and $1 > \sigma > 0$. How far τ and σ are from one depends on the steepness of the marginal cost function.

Substituting this expression into (2), equilibrium evasion in council c at date t will now be:

$$\lambda_{c,t} = G\left((1-\xi)x_{c,t} - (1-\tau)i_{c,t} + \chi\theta_{c,t} - (1-\sigma)\mu\Delta(\lambda_{c,t-1})\right).$$

This preserves the essence of our baseline model, but factors which affect the cost of enforcement are now part of $\theta_{c,t}$ and coefficient α which affects the dynamics.

Consequences Endogenous enforcement has implications for how to interpret the poll-tax shocks. First, the effect of an intrinsic-motivation shock is dampened, but *not* eliminated since $\tau < 1$.

As before, consider a temporary shock to intrinsic motivation given by (7) beginning

from a steady state. The initial impact on non-compliance is:

$$\begin{aligned}\beta_c =& G\left((1-\xi)\,x_c-(1-\tau)\,i'_{c,t}+\chi\theta_c-(1-\sigma)\,\mu\Delta\left(\hat{\lambda}_c\right)\right)-G\left((1-\xi)\,x_c+\chi\theta_c\right.\\ &\left.-(1-\tau)\,i_{c,t}-(1-\sigma)\,\mu\Delta\left(\hat{\lambda}_c\right)\right.\end{aligned}$$

And the root of the core difference equation is now

$$\alpha=-g\left((1-\xi)\,x_c-(1-\tau)\,i_c+\chi\theta_c-(1-\sigma)\,\mu\Delta\left(\hat{\lambda}_c\right)\right)(1-\sigma)\,\mu\Delta_\lambda\left(\hat{\lambda}_c\right).$$

It is clear from these expressions that the effect of a given change in $i_{c,t}$ is dampened by endogenous enforcement since $\tau<1$ and $\sigma<1$. While the initial impact on evasion will be smaller, the adjustment path back to steady state is also slower.

A.2 Data

Measuring enforcement We have also collected a proxy of council-tax enforcement. The data source is the same series of CIPFA publications used to construct the evasion measure. If a household does not comply with council-tax payments, the council's first action is to send out a reminder. If non-payment persists or payment in full is not received, the council can summon the household to attend a court hearing. Only when a summons order has been issued may the council proceed to other methods to recover the debt, including (in order of severity) taking money directly from wages and benefits, ordering bailiffs to collect the amount, placing a lien on the property, and starting proceedings for a prison sentence. Thus, reminders constitute a 'soft' signal of enforcement while issuing a summons is a more directed and costly effort by the council.

Correlations with evasion Against this background, we use the ratio of the number of court summons relative to the number of reminders in a council-year as a proxy for enforcement. If this measure proxies for exogenous enforcement ($m_{c,t}$ in our theory), it should predict decreases in tax evasion. On the other hand, if it reflects an endogenous response to evasion, we would observe a positive correlation with evasion. In a cross-sectional regression, summons over reminders is positively correlated with evasion. But in a within-council regression –i.e., one with council fixed effects –summons over reminders is negatively correlated with evasion, with an elasticity of -0.61 (std. 0.16). This indicates that our measure is a reasonable proxy of enforcement effort.

We include our measure of enforcement effort directly as a control variable in the

main regression model for council-tax evasion. The results are displayed in the bottom-right panel of Appendix Figure A.3, which remain virtually unchanged (relative to the main result in Figure 3).[12]

B A Short Primer on Local U.K. Taxation

Although the tax base changed during our sample period, the local council has retained responsibility for enforcing and spending the revenue it collects from taxes levied on households.[13] Prior to the introduction of the poll tax, a system of local rates had been in use since 1601 with minor exceptions. Rates were levied on all properties based on a measure of their rental value. This was assessed by the Valuation Office, which would upgrade the value in line with improvements. The *owner* was liable to pay tax whether a property was used for domestic or business purposes.

In 1990, domestic rates were replaced by the community charge, popularly referred to as the poll tax.[14] This was a flat-rate per-head tax that was levied at any *occupant* in a council, whether they were owning or renting their dwelling house. A few groups – including nuns, criminals, and recipients of income support – were exempted. Other low-income groups, such as students and unemployed, were liable for 20 percent of the standard amount. Otherwise, the poll tax was levied independently of an individual's income and wealth. Ostensibly, this reform was to improve political accountability by creating equal stakes for every citizen. But the tax was deemed unfair since it was not linked to individual circumstances – it broke the link between a property's value and the tax levy, a hallmark of the earlier regime and a feature of almost every existing system of local taxation. The perceived unfairness resulted in major protests and riots, which were accompanied by unprecedented levels of tax evasion by UK standards.[15]

In 1993, the poll tax was abolished and replaced by the present council tax. It is based on the value a property would have sold for in the open market on April 1st 1991. The

[12] In results not reported, we find that the results are robust to using cost of council tax collection per capita as an alternative measure of enforcement.

[13] Councils had complete ownership of revenue collected from business property taxes only up until 1989. Under the 'national non-domestic rates' from 1990, the business property tax continued to be enforced by the council, but the revenue was transferred to central government, and then partially redistributed back to councils, according to a centrally set multiplier.

[14] See Butler, Adonis and Travers (1994) for a discussion of the factors leading up to the introduction of the poll tax and its subsequent abolition.

[15] It was not the first time in British history that a poll tax had triggered a mass protest – more than 600 years before, in 1381, the poll tax is considered to have a had central place in triggering the peasants' revolt.

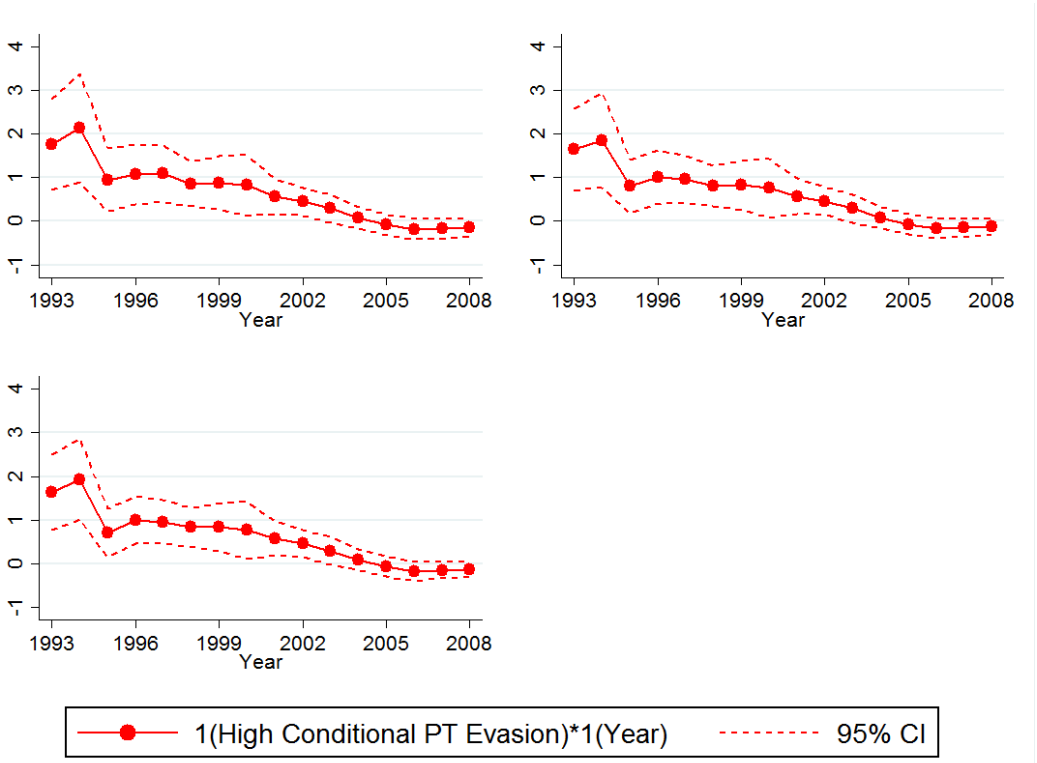
Valuation Office individually assessed each property and assigned it to one of a given set of preassigned valuation brackets. The council sets the council tax rate, which implies a liability for each bracket. Thus, the council tax results in one bill for each household that occupies a property. Like the poll tax, the council tax was paid by the occupant, whether a renter or an owner. But unlike the poll tax, the council tax reintroduced the link between taxes and property values, thus restoring some semblance of fairness in the local tax system. However, no revaluations have taken place after 1991 and no new bands have been introduced with increasing property prices.[16] As the council tax has become decreasingly detached from actual property values, its fairness have come under debate.

There is no simple way of comparing tax levels across the three tax regimes due to the different tax bases. However, we can make a rough guess of the level of taxation per dwelling.[17] This suggests that domestic rates per dwelling in 1989 were around £501 (with a standard deviation of £110), the poll tax per dwelling in 1990 was £677 (st.dev. £214) and the council tax per dwelling in 1993 was £509 (st.dev. £289). But the poll-tax number is somewhat misleading, because of cuts in 1991 and 1992 – a per-head reduction by £110 in 1991 brought the poll tax per dwelling down to almost exactly the same liability level as under the domestic rates and the council tax. Nevertheless, we may want to condition on each council's poll-tax level when analyzing evasion from this tax.

[16]This means that changes in tax liability through through mis-reporting of property valuation between years is not a concern in our setting. There have been talks of re-valuation of properties in England, but these have systematically been postponed. However, in Wales, re-valuation of properties occurred in April 2003.

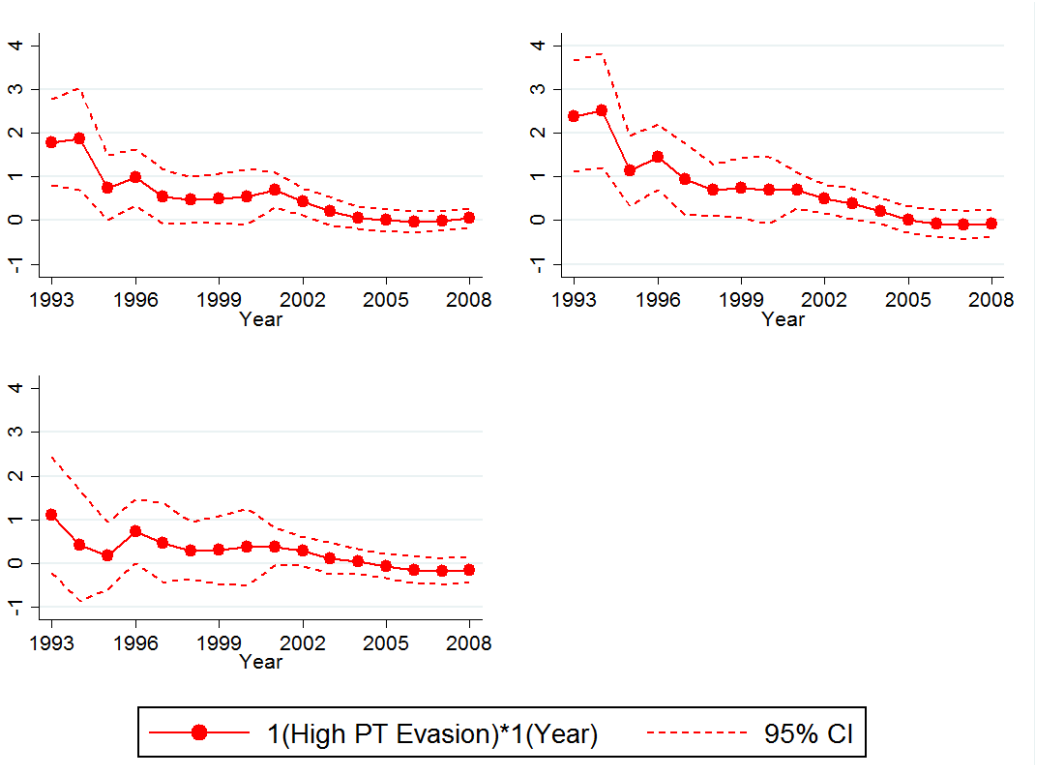
[17]The methodology from CIPFA (1993, page 8, rows 12 and 16-17) is used to calculate the poll tax per dwelling in 1990. However, using this method, poll tax per dwelling is missing for approximately 30% of the councils. CIPFA (1993) has data on domestic rates per dwelling in 1989 and the council tax per dwelling in 1993.

Figure A.1



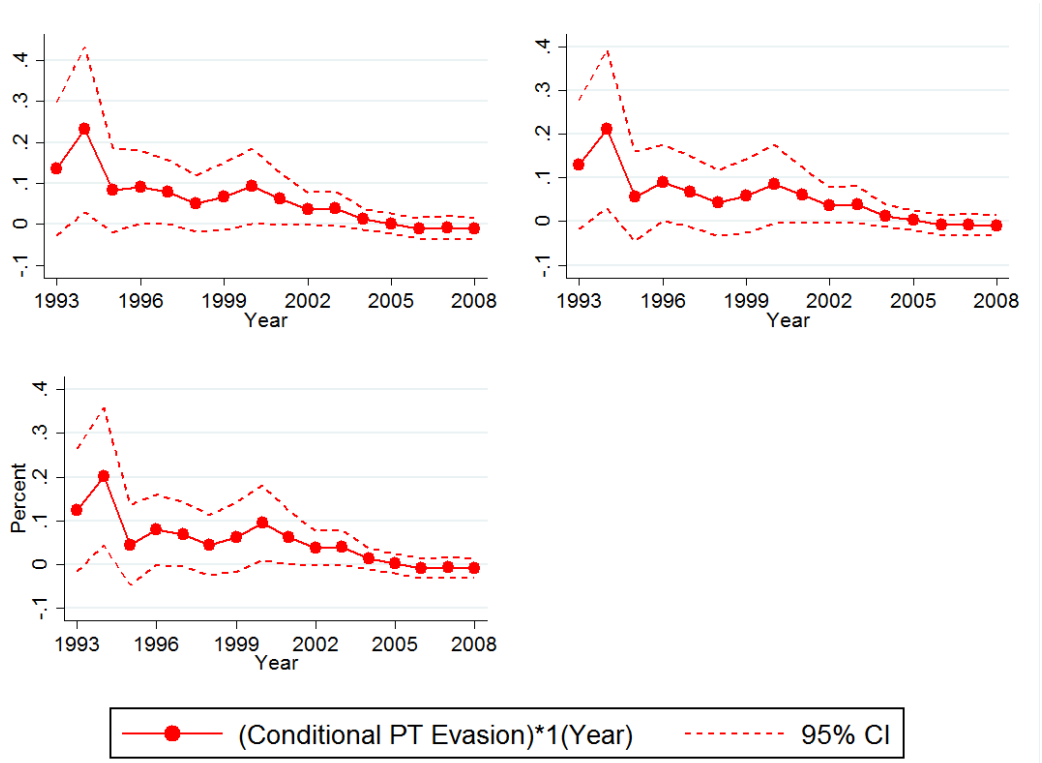
Notes: The top-left graph is derived from a regression of Council-Tax evasion, which includes a set of year fixed effects and a set of council fixed effects. Each red dot marks the estimated coefficient on the corresponding year dummy interacted with a dummy for conditional Poll-Tax evasion (net of average Domestic-Rates evasion 1980-89) above the median. The top-right graph plots the coefficients when the top-left regression model is augmented with a full set of year-by-region interactive fixed effects. The bottom panel plots the coefficients when the top-right regression model is augmented with a full set of interactive fixed effects for year-by-property type and year-by-Labour control. The property type measures the share of properties that are privately rented during the Poll-Tax period (1990-1992), while Labour control measures is set equal to one if the Labour party had majority control of the council in any year of the Poll-Tax period. In all panels, the sample period is 1993-2009 (and 2009 the omitted year). Dashed lines denote the 95-percent confidence interval on the interaction term between year-dummies and high conditional poll-tax evasion, with standard errors clustered by council. Subsection 3.2 gives more details on the construction of the conditional poll-tax evasion measure.

Figure A.2



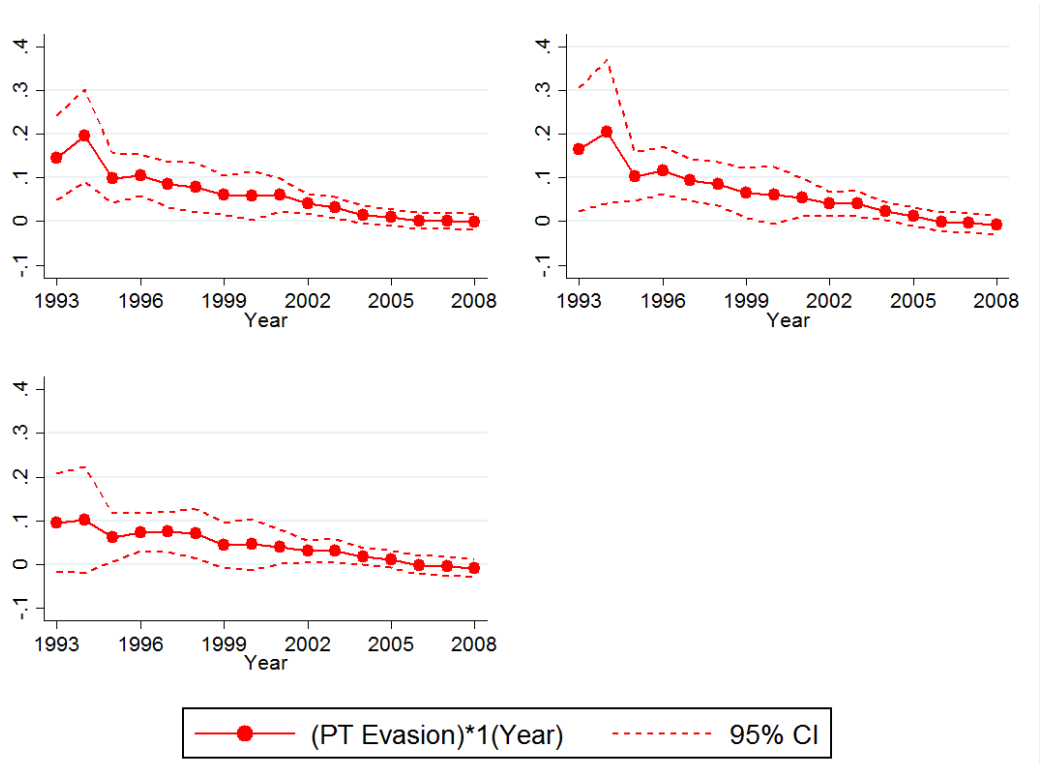
Notes: The graphs in this figure are based on exactly the same regression models as in Figure A.1, except that the high conditional Poll-Tax evasion dummy is replaced with a high (unconditional) Poll-Tax evasion dummy.

Figure A.3



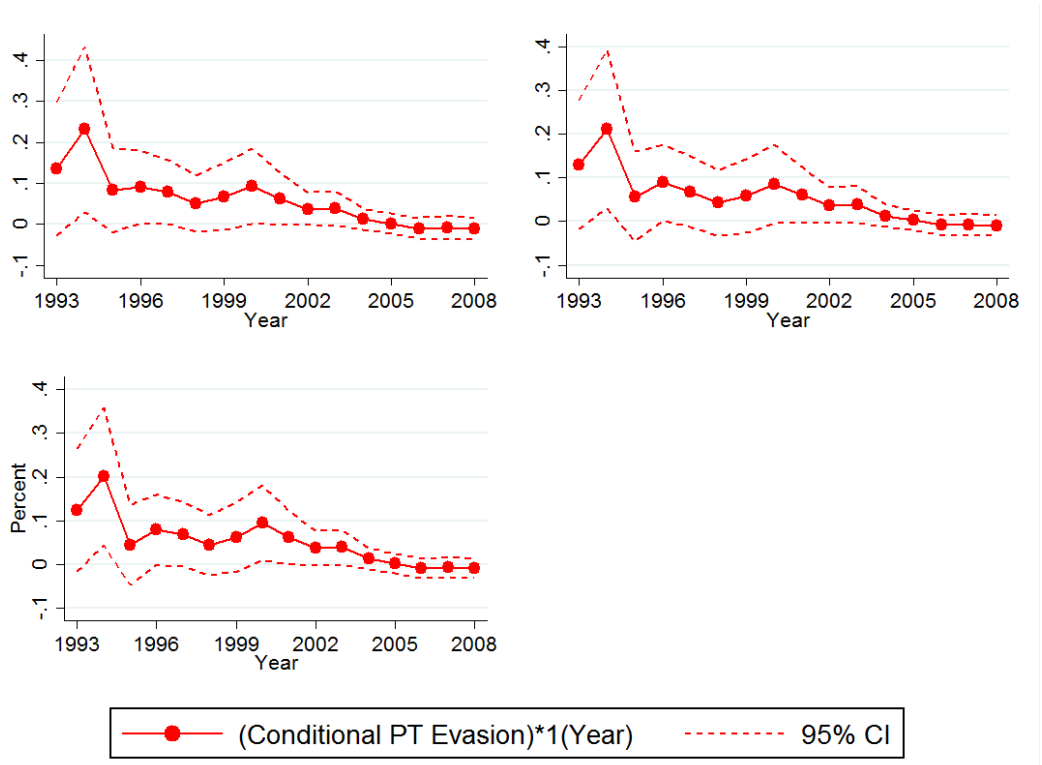
Notes: The graphs in this figure are based on the same regression models as in Figure A.1, except that the high conditional Poll-Tax evasion dummy is replaced with a continuous Conditional Poll-Tax evasion variable. Each red dot in the top left graph thus marks the estimated coefficient on the corresponding year dummy interacted with a continuous measure of conditional Poll-Tax evasion (net of average Domestic-Rates evasion 1980-89). The top-left and the bottom graphs show those coefficients, when the same variables are added to the specification as in the corresponding graphs of Figure A.1.

Figure A.4



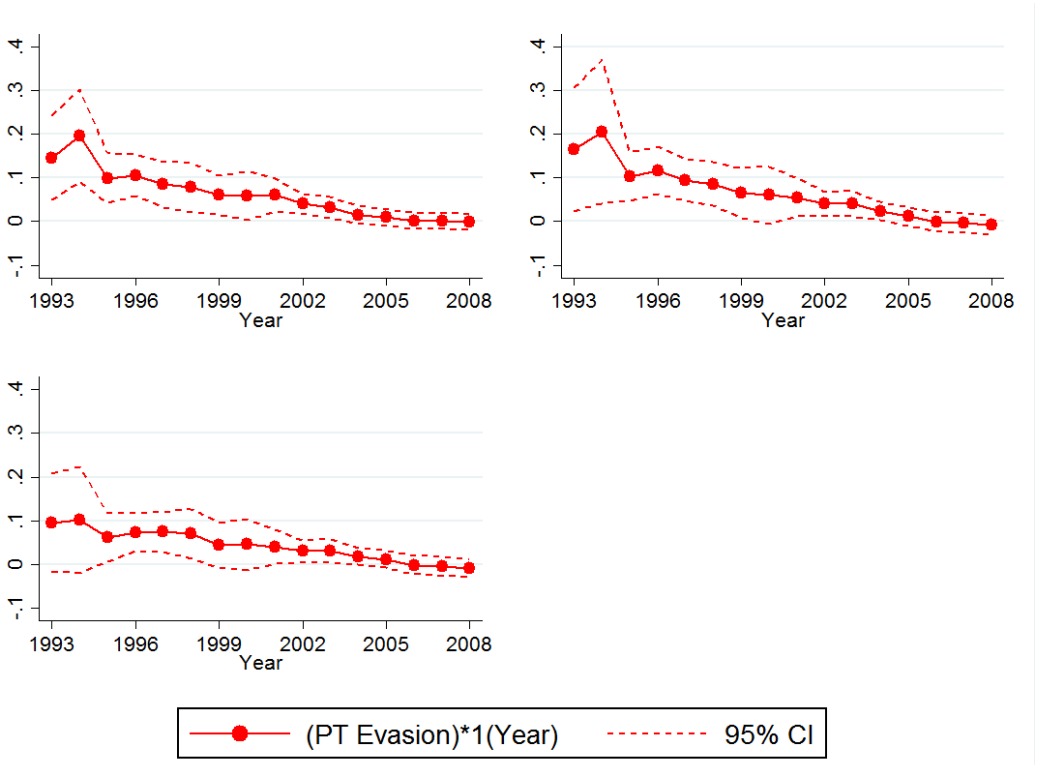
Notes: The graphs in this figure are based on the same regression models as in Figure A.3, except that the continuous conditional Poll-Tax evasion measures in the interaction effects are replaced with continuous (unconditional) Poll-Tax evasion measures.

Figure A.5



Notes: The graphs in this figure are based on the same regression models as in Figure A.3, except that the continuous conditional Poll-Tax evasion measure is calculated net of average Domestic-Rates evasion between 1987 and 1989.

Figure A.6



Notes: The graphs in this figure are based on the same regression models as in Figure A.4, except that the continuous Poll-Tax evasion measure is calculated net of average Domestic-Rates evasion between 1987 and 1989.