Public Trust, Taxes and the Informal Sector

Ceyhun Elgin[*]
Bogazici University

Mario-Solis Garcia[†]
University of Minnesota

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Abstract

Several studies surprisingly associate higher taxes with smaller informal economy. To account for this phenomenon we build a simple model of optimal taxation and argue that this can be explained by differences in public trust for governments. In equilibrium, if producers' trust in the government is lower (higher), the government announces a lower (higher) tax rate on the formal sector, but more (less) producers chose to stay in the informal economy. Finally, using panel data estimation techniques we provide empirical support for our theory.

Keywords: informal sector, tax evasion, public trust, subgame-perfect equilibrium.

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[*]Corresponding author. Address: Bogazici University, Department of Economics, Natuk Birkan Building, 34342 Bebek, Istanbul, (Turkey). e-mail: `ceyhun.elgin@boun.edu.tr`.

[†]Address: University of Minnesota, Department of Economics, 1925 4th Street S. Hanson Hall: 4-101, Minneapolis, MN, 55455, (United States). e-mail: `msolis@econ.umn.edu`.

INTRODUCTION

A common result in models dealing with an informal sector is a positive relationship between the level of tax rates and the size of the informal sector. A non-exhaustive list of the papers in this literature include Rauch (1991), Loayza (1996), Fortin et. al. (1997), Ihrig and Moe (2004), Busato and Chiarini (2004), Amaral and Quintin (2006) and more recently Delipalla (2009). Treating taxes as exogenous and letting the informal sector not pay any taxes (or to pay only a fraction of those paid by the formal sector), this result is immediate in a two-sector (formal and informal) neoclassical growth model where the role of the government is passive.

The problem with the theoretical result described above is that it is not supported by recent comprehensive empirical studies. Even though earlier empirical studies, using either firm-level or macro data of limited size on the informal economy such as Frey and Pommerehne (1984), Schneider (1994,1997), Tanzi (1999), Davis and Henrekson (2004) where taxes are left out to play an exogenous role, provided support for a positive correlation between taxes and informal sector size, several recent cross-section and panel data empirical studies, using considerably larger datasets and allowing for the possible endogeneity of taxes, associate higher taxes with a smaller size of the informal economy. Examples are Johnson et. al. (1997), Johnson et. al. (1998), Friedman et. al. (2000), and Torgler and Schneider (2007).[1] Plotting informal sector size vs. tax burden[2], corporate tax rate, average labor income tax rate, or top marginal income tax rate in a cross-section clearly indicates a negative relationship between these variables. In particular, Figure 1 shows the relationship between the size of the informal sector and the tax burden. Moreover, the above mentioned studies show that this negative empirical relationship remains significant even after controlling for several variables. Additionally, on the theoretical side, Aruoba (2010), Hatipoglu and Ozbek (2011), and Elgin (2011) are among the exceptions, that by endogenizing taxes have the potential to account for the negative correlation between taxes and informality.

PUT FIGURE 1 ABOUT HERE

In this paper, to contribute to this latter stream of literature, we develop a simple model of optimal taxation and argue that the negative correlation between tax rates and the size of the informal sector can be explained by differences in public trust for governments. In our model, given a tax rate set by the government, producers choose whether to operate in the informal sector and not to pay any taxes or to stay in the formal sector, gaining access to capital markets, but facing government scrutiny and paying taxes. Given the producers' optimal behavior, the government chooses the tax rate to maximize its expected tax revenue. The key friction we introduce in the model is that producers do not fully trust the government's policy announcement and believe that it might expropriate formal producers' output. In equilibrium, if producers' trust in the government is lower (higher), the government announces a lower (higher) tax rate on the formal sector, but more (less) producers

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[1]Friedman et. al. (2000) provides an excellent account of the literature on the relationship between taxes and informality.

[2]Tax burden is defined as the ratio of the total tax revenue to GDP. Sources of this data will be made clear in the empirical section of the paper.

chose to stay in the informal economy. Finally, using dynamic panel estimation techniques, we present empirical evidence that our theory is consistent with the data. Specifically, we show that once certain institutional and political risk variables we use to proxy public trust are controlled for, the data indicates a positive correlation between the tax rate and the size of the informal economy.

The rest of the paper is organized as follows: Next section describes the model economy. Then, we present simulations of the model economy numerically characterizing the model. In this section we also compare the model against the data. Then, in section four we conduct a panel data econometric analysis which supports the hypotheses implied by the model. Finally, we provide concluding remarks.

A SIMPLE MODEL

We assume that there are two kinds of agents in the economy, a continuum $[0,1]$ of household-producers, each denoted by i, and a government.

We assume household-producers (shortly households) have access to two production technologies which allow them to produce output. In turn, each household obtains utility from the resulting profits; this is,

$$U(i)[\pi(i)] = \mathbb{E}u[\pi(i)], \quad i \in [0,1] \tag{1}$$

where $\mathbb{E}$ is the expected value operator, $u(\cdot)$ is a strictly increasing, concave, and twice continuously differentiable function, and $\pi(i)$ represent household i's profits.[3]

All households have identical preferences and are endowed with one unit of time, which they can only use for labor. We also assume that each household draws a productivity parameter $\theta(i)$ from some known distribution Θ. Then the household decides on which technology to use, in other words choses in which sector to supply it's labor input $N(i) = 1$. The production technologies, here denoted *formal* and *informal*, are explained below as follows:

Formal technology The first production technology combines each household's capital $K(i)$[4] and labor $N(i)$ to produce output $Y(i)$. We assume that this technology takes the following functional form:

$$Y_F(i) = \exp[\theta(i)] [K(i)]^\alpha [N(i)]^{1-\alpha} = \exp[\theta(i)] [K(i)]^\alpha = z(i) [K(i)]^\alpha, \quad i \in [0,1]$$

where $\theta(i)$ is household i's productivity parameter, $\alpha \in (0,1)$, and where we define $z(i) := \exp[\theta(i)]$. (The value of α is the same for all households.) As mentioned above, households can provide labor but have no capital: They need credit to produce their optimal level of output. We further assume that the only way that households can access the credit market is if they decide to become part of the formal sector. It is a simple matter to verify that a formal household's expected profits $\mathbb{E}\pi_F(i)$ are given by the following:

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[3]In what follows, we will assume linear utility for simplicity, i. e. $u[\pi(i)] = \pi(i)$.

[4]To keep the model as simple as possible we assume that households have access to as much capital they want to employ in the production at some exogenous rate r

$$\mathbb{E}\pi_F(i) = Y_F(i) - rK(i) - \mathbb{E}T(i), \quad i \in [0,1] \tag{2}$$

where $\mathbb{E}T(i)$ are the household's expected tax payments.

Informal technology The second production technology consists of a labor-exclusive process which provides output to obtain utility above a minimum subsistence level u_0. We think of this as a residual technology, in the sense that households that decide to go to the informal sector are obliged to use this technology (given their inability to get capital). We assume this technology takes the following functional form:

$$Y_I(i) = \exp[\theta(i)]\,[N_i] = z(i), \quad i \in [0,1].$$

Consequently, profits for an informal household are given by

$$\pi_I(i) = Y_I(i), \quad i \in [0,1]. \tag{3}$$

In this sense, a household's decision is simple: Become a part of the formal sector or a part of the informal sector. Households that choose to go to the formal sector are required to pay a rent for the used capital (here assumed to be some exogenous value r dictated by an authority external to the model, like a central bank) and are required to pay taxes. On the other hand, households in the informal sector are not subject to government taxation but also don't have access to capital.

Using (1) – (3), it follows that the utility maximization problem of household i is given by

$$\max_{K(i) \geq 0} \left\{ \mathbb{E}u\left[\pi_F(i)\right], u\left[\pi_I(i)\right] \right\}, \quad i \in [0,1]. \tag{4}$$

Now we turn to the second agent of our model economy, the government.

The Government

There is a government in the model that wishes to maximize its tax revenues R. We assume that the government announces a plan to charge formal households a percentage τ of their output.[5]

Households that decide to become a part of the formal sector have to turn in all relevant asset and output information to the government; a household loses all possibility of hiding any outcome from the government. [6] Furthermore, we assume here that households form an expectation over the government's announced tax schedule. With some probability λ, they believe that the government will commit to its announcement and impose the announced rate τ. However, with some probability, $1 - \lambda$, there is a risk of expropriation. [7] For a household in the formal sector, expected tax payments $\mathbb{E}T(i)$ take the form

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[5]We have also performed the same calculations for the case of a proportional tax on profits; since the qualitative and quantitative results are not changed, we use the proportional tax over output throughout the document. These alternative simulations can be obtained from the authors upon request.

[6]One can also interpret this that in exchange, the government extends a "quality seal" that allows households to access the credit market.

[7]Here, we interpret λ to some extent as a proxy variable for public trust depending on institutional quality and government commitment.

$$\mathbb{E}T(i) = [\lambda\tau + (1-\lambda)]\, z(i)\, [K(i)]^\alpha, \tag{5}$$

where τ is the originally-announced taxation plan of the government.

Therefore, the government solves the following problem[8]:

$$\max_\tau \int_{\theta_V}^1 R\, f(i)\, di = \max_\tau \int_{\theta_V}^1 \tau z(i)\, [K(i)]^\alpha\, f(i)\, di, \tag{6}$$

where θ_V is the potential threshold where households having a productivity above it chose to operate in the formal sector, thereby constituting the tax base of the government.

The timing of the static game is as follows: First, households receive their productivity parameter $\theta(i) \in \Theta$. Next, the government announces the tax rate it is supposed to charge on formal output, τ. Households observe the government's decision and, contingent on their productivity parameter $\theta(i)$ and their beliefs over the government's commitment to τ, $\mathbb{E}(\lambda)$, decide to go formal or informal. Formal agents access the credit market, obtain their optimal level of $K(i)$ and produce. The government observes all formal agents and their output; then, it taxes according to the original plan, τ. Households get utility $U(i)\,[\pi(i)]$ and informal households' profits are given by (3). The government consumes the value of the tax revenue which results after solving (6).

Given the description of the model above, now we can define the competitive equilibrium.

Definition 1: A **competitive equilibrium** of the above defined environment is given by the tax rate τ, $K(i)$, $Y_I(i)$ and $Y_F(i)$ for all $i \in [0,1]$ such that given τ, r, and λ; $K(i)$, $Y_I(i)$ and $Y_F(i)$ solve the household producers' problem defined by (4) for all $i \in [0,1]$.

In the competitive equilibrium, only households above some threshold level of productivity choose to stay in the formal sector. This result is stated in the proposition below:

Proposition 1: Taking λ as given, a household i with a productivity parameter $\theta(i)$ operates in the formal sector if and only if $\theta(i) \geq \theta_V(i)$, where $\theta_V(i)$ is defined by

$$\theta_V(i) = \left(\frac{\alpha-1}{\alpha}\right)\left[\log(1-\tau) + \log A + \log\lambda - \left(\frac{\alpha}{1-\alpha}\right)\log r\right], \tag{7}$$

where $A := \left(\alpha^{\alpha/1-\alpha} - \alpha^{1/1-\alpha}\right)$.

Proof. Consider any household i with productivity parameter $\theta(i)$. If the household decides to go to the formal sector, its profits are given by (2) above. In that case the first-order condition with respect to capital implies that the optimal level of capital should satisfy

$$K(i) = \left[\frac{\alpha\lambda(1-\tau)z(i)}{r}\right]^{\frac{1}{1-\alpha}}. \tag{8}$$

Using the above equation in (7), and recalling that the household solves (4), it follows that a household is indifferent between operating in the formal or the informal sector if and only

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[8]Our results are not sensitive to whether the government also forms an expectation over the two possible outcomes or not.

if its profits are the same in either sector; this is, if and only if $\pi_F(i) = \pi_I(i)$, or

$$A \left[\frac{\lambda(1-\tau)z(i)}{r^\alpha} \right]^{\frac{1}{1-\alpha}} = z(i).$$

Apply the log function to the equation above and rearrange to get the desired result. □

Notice that, since we assume the existence of a unit measure of households, we can interpret $\theta_V(i)$ as a proxy for the size of the informal sector.[9]

Moreover, a straightforward application of Proposition 1 is presented in Corollary 1.

Corollary 1: If the government decides to reduce taxes τ, or if the exogenous authority (for example the central bank) decides to decrease the interest rate r, or if there is an increase in the public trust in the government, the size of the formal sector increases.

Proof. From (7) and (9) it is straightforward to verify that

$$\frac{\partial \mathbb{E}\pi_F(i)}{\partial \tau} = -\Gamma \left[\frac{\lambda z(i)}{r^\alpha} \right] < 0, \quad \frac{\partial \mathbb{E}\pi_F(i)}{\partial r} = -\alpha\Gamma \left(\frac{1}{r^{\alpha+1}} \right) < 0 \text{ , and}$$

$$\frac{\partial \mathbb{E}\pi_F(i)}{\partial \lambda} = \Gamma \left[\frac{(1-\tau)z(i)}{r^\alpha} \right] > 0,$$

where

$$\Gamma = \left(\frac{A}{1-\alpha} \right) \left[\frac{\lambda(1-\tau)z(i)}{r^\alpha} \right]^{\frac{\alpha}{1-\alpha}}. \qquad \square$$

Here we should note that, taking taxes exogenously given, we still have a positive correlation between the level of taxes and the size of the informal sector. Keeping the discussion we made in the introduction in mind this is not surprising. Our next task is to endogenize the determination of taxes.

Subgame-perfect Equilibrium

Remark 1: Using the backward solution algorithm, given the announced τ and λ, the value of θ_V can be obtained from equation (8). The government can also calculate this cutoff value (which depends on τ) and then chooses τ to solve

$$\max_{\tau \in [0,1]} \quad \int_{\theta_V(\tau)}^1 A \left[1 - (1-\tau) \right] \left[\frac{z(i)}{r^\alpha} \right]^{\frac{1}{1-\alpha}} f(i) \, di \qquad (9)$$
$$\text{subject to} \quad \tau \in [0,1].$$

Definition 2: A **subgame-perfect equilibrium** of the above defined environment is given by the tax rate τ, $K(i)$, $Y_I(i)$ and $Y_F(i)$ for $i \in [0,1]$ such that given r, and λ;

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[9]Notice that the actual size of the informal sector as percentage of formal output is given by the following expression which obviously is an increasing function of $\theta_V(i)$:

$$\frac{\int_0^{\theta_V(i)} Y_I(i)f(i)di}{\int_{\theta_V(i)}^1 Y_F(i)f(i)di}$$

1. τ solves the government's problem defined by (9).

2. For every possible $\tau \in [0,1]$; τ, $K(i)$, $Y_I(i)$ and $Y_F(i)$ for $i \in [0,1]$ constitute a competitive equilibrium.

Noticing that the informal sector size, $\theta_V(i)$ and the tax rate, τ, are both endogenously determined in the model; specifically, we want to obtain comparative static results with respect to λ. Unfortunately, the above defined government maximization problem does not allow us to obtain analytical results. However, it is straightforward to numerically simulate the model economy and characterize it through numerical simulations.

NUMERICAL RESULTS

We perform a set of numerical simulations to get a flavor of the implications of Proposition 1 and Corollary 1. [10]

Cutoff Productivity and Tax Revenue with Variable Taxes

We are first interested in determining how the cutoff productivity value θ_V and the government's tax revenue R are affected by varying the value of taxes τ, for a given value of λ. To do this, we create a grid (of step size 0.01) and we allow τ to move in the interval $[0.01, 0.99]$, fixing the value of λ at 0.75.[11] We perform 1,000 repetitions and obtain the average values for θ_V and R. Figure 2 below shows the results of this simulation.

PUT FIGURE 2 ABOUT HERE

From Figure 2 we observe that, keeping the level of public trust constant, tax receipts show a Laffer effect and the total revenue of the government is maximized when $\tau = 0.29$. (For our simulation, $R_0 = 0$ for $\tau \geq 0.49$ because all households become informal after this point.) In addition, and as claimed by Corollary 2.3, the higher the tax rate, the higher the cutoff productivity value (i.e., the value of θ_V) one needs to be in order to remain in the formal sector.

Cutoff Productivity and Tax Revenue with Variable Commitment

Our second experiment is to determine how θ_V and R are affected by varying the value of λ, for a given tax rate. We follow the procedure of the last subsection, and we allow λ to move in the interval $[0.01, 0.99]$, fixing the value of τ at 0.25. Again, we perform 1,000 repetitions and obtain the average values for θ_V and R. Figure 3 below shows the results.

PUT FIGURE 3 ABOUT HERE

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[10]In all of the simulations of subsections 3.1, 3.2 and 3.3, we choose parameter values $\alpha = 1/3$ and $r = 0.06$, and we also assume $\theta(i) \sim \mathcal{N}(0,1)$. We allow for a population of 1,000 households. Our results are qualititatively robust with respect to the changes in the number of households or the choice the parameters.

[11]Setting λ to 0.75 is only for expositional purposes and does not qualititatively change the results. More is presented in subsection 3.3.3.

From Figure 3 we observe that the cutoff productivity value decreases as λ increases, as suggested by Corollary 1. Moreover, tax revenue is positive and strictly increasing in λ provided that $\lambda \geq 0.5$.

Cutoff Productivity and Tax Revenue: The General Case

Finally, now we allow for both λ and τ to vary simultaneously to get a flavor of the characterization of the subgame-perfect equilibrium.

To keep the results manageable, we perform a simulation where we use a grid of step size 0.1, and we move λ between 0.1 and 1.0, and τ between 0.1 and 0.9.[12] As was the case in the previous subsections, we perform 1,000 repetitions and obtain the average values for θ_V and R_0.

In order to fully characterize a result that is dependent both on the productivity parameter θ_V and on the tax announcement τ, we use the following simplification: The values of the x-axis take the form $x = 10 \cdot \lambda + \tau$; in this way, a value of x of 4.6 has associated parameters of $\lambda = 0.4$ and $\tau = 0.6$. Figure 4 below shows the results of this procedure:

PUT FIGURE 4 ABOUT HERE

On the other hand, in Figure 5, we change r to 0.02. From the figures it is clear that cutoff productivity for being formal has a positive relationship with τ and a negative relationship with λ, as expected by Corollary 2.3.

PUT FIGURE 5 ABOUT HERE

Endogeneous Taxes

Now we look at the numerical characterization of the subgame-perfect equilibrium where the government chooses the optimal tax rate on the formal sector to maximize its revenue. Our ultimate purpose here is to get comparative statics results of all the relevant variables including τ, with respect to λ. For this subsection we use $\alpha = 0.4$ at and $r = 0.07$.[13] We also assume $\theta(i) \sim \mathcal{N}(0, 1)$ and allow for a population of 1,000 households.

PUT FIGURE 6 ABOUT HERE

Figure 6 presents the behavior of the optimal tax rate τ obtained from the government's problem with respect to λ. The main result is that higher public trust allows for a government to charge a higher tax rate on the formal sector.

PUT FIGURE 7 ABOUT HERE

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[12]We make the decision to truncate the value of τ at 0.9 for two reasons. First, as suggested by Figure 3, values of τ greater than a threshhold are not relevant in terms of revenue maximization for the government. Second, as $\tau \to 1$, the cutoff productivity value increases exponentially; this complicates the interpretation of the results.

[13]The parameter values we used in the previous subsections were chosen somewhat arbitrarily. However, one ultimate purpose of this subsection is to compare the model simulations against the data. Therefore, as the next section will document the average risk premium in the data is 0.07. Moreover, we chose α to bring the model to the data as close as possible.

On the other hand, Figure 7 shows that the informal sector size is a decreasing function of λ. Notice that Figure 3 draws a similar relationship. However, as opposed to Figure 3, in Figure 7 with increasing λ, not only informal sector size decreases but also we have an increasing level of τ. In other words, increasing public trust increases the tax rate but reduces the informal sector size at the same time.

<center>PUT FIGURE 8 ABOUT HERE</center>

Finally, in Figure 8 we compare the model simulation against its data counterpart. Specifically, for different degrees of λ, we regress the model-generated informal sector size, i.e. $\frac{\int_0^{\theta_V(i)} Y_I(i)f(i)di}{\int_{\theta_V(i)}^1 Y_F(i)f(i)di}$, on the optimal tax rate given by the model. This is the line denoted by "model". To compare it against the data, Figure 8 also plots informal sector size in the data against the tax burden, along with the simple linear regression line obtained using these variables in the data. Our choice of $\alpha = 0.4$ becomes now clear as we have chosen it's value to make the model generated regression line as close as possible to it's data counterpart. In summary, we can say that the model is successful in accounting for the negative cross-country correlation between taxes and the size of the informal economy.

<center>EMPIRICAL EVIDENCE</center>

Data

Different methodologies have been proposed in the literature to estimate the size of the informal economy for a given economy. Even though these estimations are imperfect by their nature,[14] they are safely used for empirical cross-country analysis. In the empirical analysis, we obtain our informal sector size estimates from the widely used estimates of Schneider et al. (2010).

As a measure for taxes, in the reported results we use the tax burden data, defined as the ratio of the tax revenue to GDP, from Government Finance Statistics. [15]

In the regression analysis we use several variables to proxy λ in the model. These are the the government stability, rule of law, internal conflict, investment profile and democratic accountability indices obtained from Political Risk Services (ICRG). [16]

Moreover, we also use two other control variables such as GDP per-capita and risk spread. We got the data for GDP per-capita from the Groningen Economic Growth and Development Center and the risk premium both from Moody's and Aswath Damodaran's website at `http://pages.stern.nyu.edu/~adamodar/`.

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[14]We refer the readers to Schneider (2007) for a discussion of various methods used to estimate the size of the informal sector.

[15]Several other tax indicators, tax rate on income, profits and capital gains from the World Development Indicators or the fiscal freedom index from the Heritage Foundation have also been examined and results do not depend on the choice of the tax measure or whether we use tax burden our official tax rates for our analysis.Regression results using statutory taxes rather than taxes burden are available upon request. Moreover, also see Elgin (2010) for a discussion of the choice of the relevant tax indicator in this context.

[16]In the regressions we included these variables in one composite index named public trust defined as the sum the five variables divided by the sum of the maximum values these variables might take. This ensures that the index we have is between 0 and 1, similar to λ we use in the model as it's counterpart.

<center>9</center>

PUT TABLE 1 ABOUT HERE

Summary statistics of all variables are provided in Table 1. In total, our data is an unbalanced panel with 132 countries and a time horizon of 9 years, from 1999 to 2007.

Estimation and Results

The dynamic panel equation we estimate will be of the following form:

$$IS_{i,t} = \beta_0 + \beta_1 IS_{i,t-1} + \beta_2 tax_{i,t} + \beta_3 trust_{i,t} + \sum_{k=3}^{n} \beta_k X_{k_{i,t}} + \theta_i + \gamma_t + \epsilon_{i,t}$$

where $X_{k_{i,t}}$ are the other explanatory variables in addition to lagged informal sector size, tax burden and public trust. θ_i and γ_t are the country and period fixed effects, respectively. Moreover $IS_{i,t}$ is the size of the informal sector relative to GDP, $IS_{i,t-1}$ is its lagged value and $tax_{i,t}$ is the tax burden.

PUT TABLE 2 ABOUT HERE

Basically, we run two sets of regressions. In the three columns of the Table 2 (denoted by FE), we report the results of the fixed-effect linear panel regressions with AR (1) disturbances.[17] In the last three columns (denoted by GMM) we repeat the same analysis using the generalized method of moments estimator (GMM) à la Arellano and Bond (1991). Here we also use one-period lagged value of the independent variables as a dependent variable.

As one can observe from Table 2, if the public trust variable is not added to the regression, the coefficient of the tax rate is negative. However, once the public trust index is controlled for, the coefficient of the tax rate changes its sign and becomes positive. Even after GDP per-capita and risk premium are added to the regression analysis, the sign of the tax coefficient remains positive This result is in line with our model where for fixed values of λ (or once higher taxes imply a larger informal sector.

PUT TABLE 3 ABOUT HERE

Finally, it will also be of interest to estimate simultaneous systems of equations, as this allows us to evaluate the effect of the public trust on taxes jointly with the effects of public trust, taxes, and other relevant variables on the informal sector size. We conduct a systems estimation using three different estimators: three-stage least squares (3SLSL), ordinary least-squared (OLS), and finally GMM. As the estimation results in Table 3 confirm, the empirical analysis supports our theory. Specifically, a higher level of public trust is associated with higher taxes. And once public trust is controlled for, higher taxes are associated with a larger informal sector. Moreover, higher public trust, lower risk premium and a higher level of national income are all associated with a smaller informal economy.

CONCLUDING REMARKS AND DISCUSSION

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[17]Hausman test points us in favor of a fixed - effect regression and Wooldridge test rejects absence of autocorrelation.

In this paper we have developed a model to account for the surprising negative relationship between the tax burden and the size of the informal economy. Specifically, using a simple model of optimal taxation we endogenize the determination of taxes and introduce a friction to the model by allowing producers not fully trust in the government that it will actually impose the announced tax rate. In equilibrium, if producers' trust in the government is lower (higher), the government announces a lower (higher) tax rate on the formal sector; but more (less) producers chose to stay in the informal economy. The idea here is that, once tax authorities internalize the response of agents when setting tax policy, governments that lack credibility may face very steeply decreasing returns to raising taxes and consequently opt for lower tax rates. Since governments with less credibility are more likely to mistreat formal producers ex-post, those economies will also tend to have smaller formal sectors. Finally, using dynamic panel estimation techniques we present empirical evidence that our theory is consistent with the data.

Our model can be extended by endogenizing the varying degree of commitment retained by governments. This can be done in a political economy model of optimal taxation.

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1 Figures and Tables
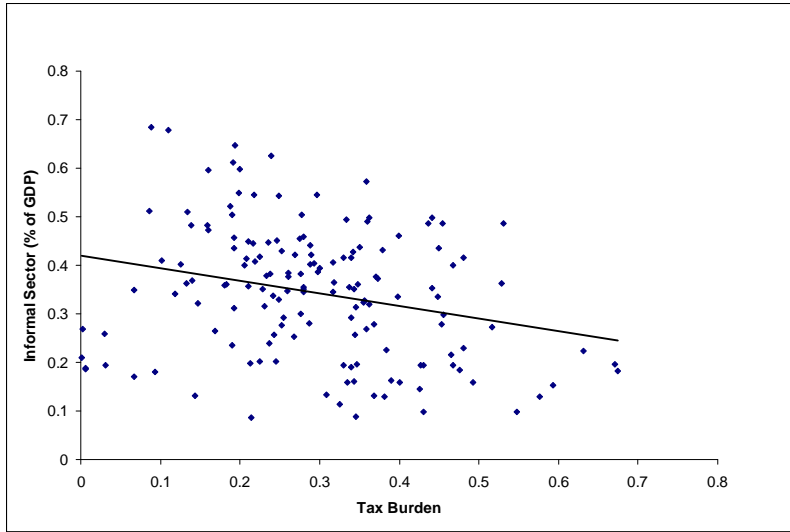
Figure 1: Informal Sector vs. Tax Burden

Figure 2: Tax revenue and cutoff productivity with varying taxes
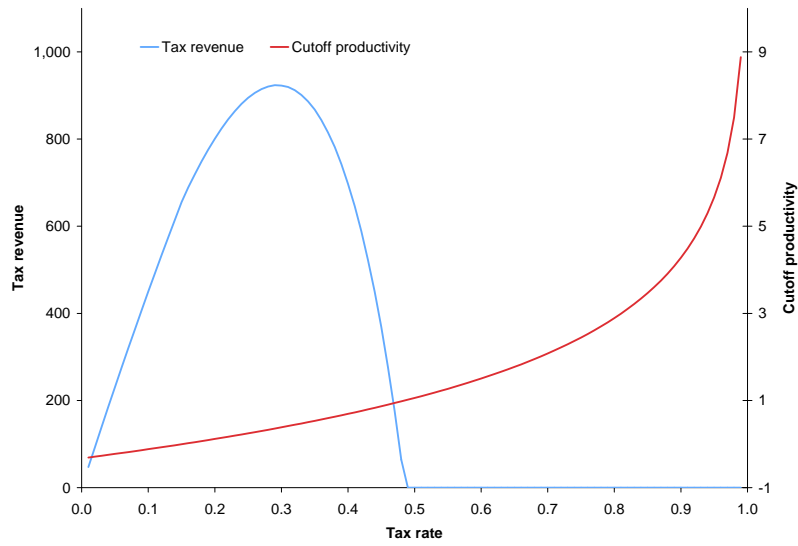
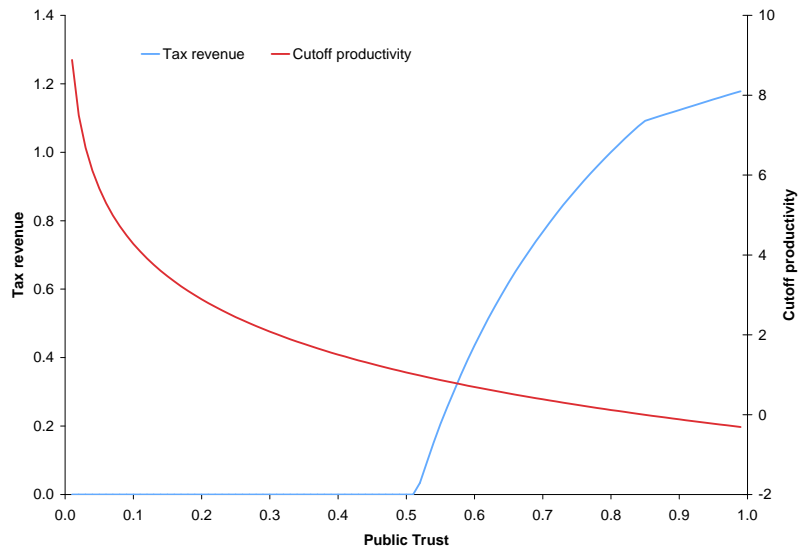**Figure 3: Tax revenue and cutoff productivity with varying public trust**

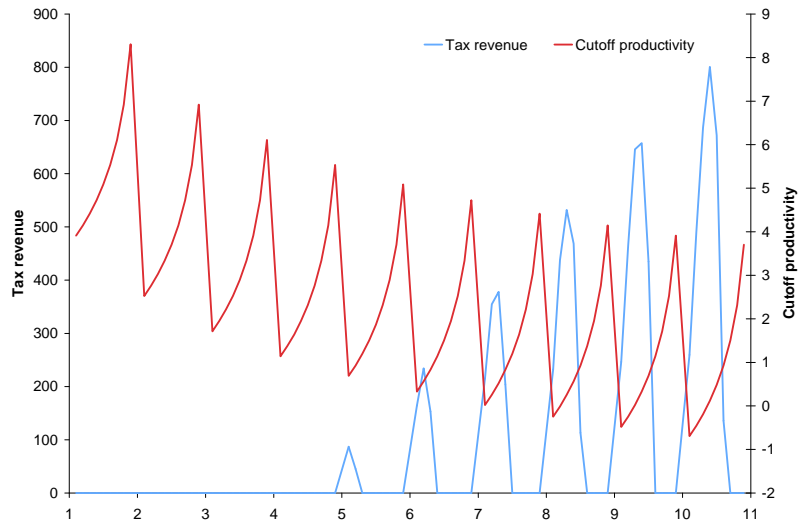**Figure 4: Tax revenue and cutoff productivity with varying taxes**

Figure 5: Tax revenue and cutoff productivity with varying public trust (with r=0.02)
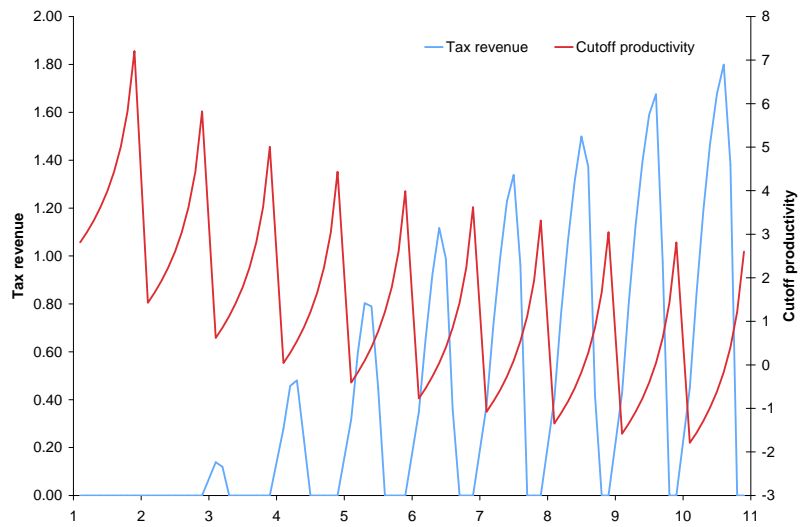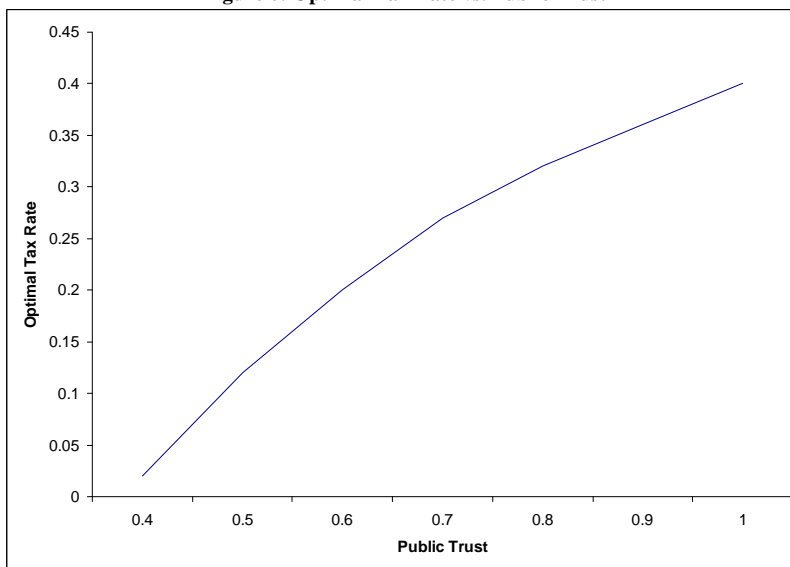

Figure 6: Optimal Tax Rate vs. Public Trust
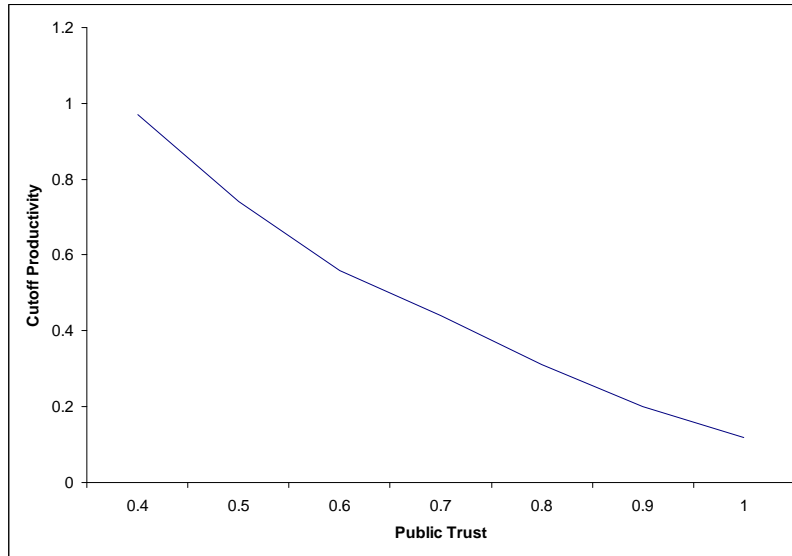
Figure 7: Cutoff Productivity vs. Public Trust
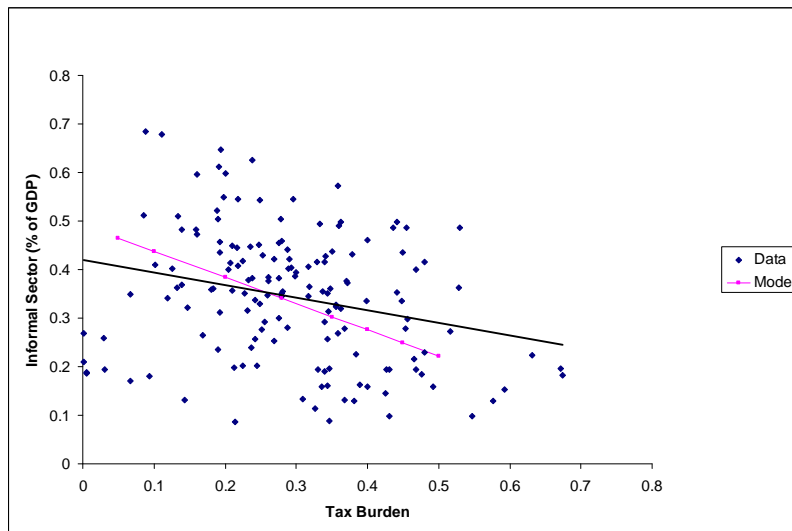

Figure 8: Data vs. Model Regressions

Table 1: Summary Statistics

	Mean	Std. Dev.	Minimum	Maximum
Tax Burden (in %)	29.30	13.43	0.10	67.48
Informal Sector Size (in %)	34.40	13.46	8.60	68.35
Political Stability	9.17	0.99	6.82	11.36
Rule of Law	3.86	1.30	1.00	6.00
Investment Profile	8.69	2.01	2.62	11.72
Democratic Accountability	4.02	1.59	0.15	6
Internal Conflict	9.77	1.48	4.54	11.99
Risk Premium	0.07	0.08	0.04	0.5
GDP per-capita(in thousand GK$)	13.37	9.63	1.20	36.20

These are cross-section summary statistics of the panel averages.

Table 2: Informal Sector and Tax Burden

Dependent variable: IS

	FE	FE	FE	GMM	GMM	GMM
IS(-1)				0.82***	0.59***	0.62***
				(0.12)	(0.16)	(0.15)
Tax	-0.02**	0.02***	0.01***	-0.01**	0.02***	0.002***
	(0.01)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Public Trust		-0.006**	-0.006**		-0.009**	-0.002**
		(0.003)	(0.003)		(0.004)	(0.001)
Risk Premium (r)			0.009**			0.007*
			(0.004)			(0.004)
GDP per-capita			-0.01**			-0.005***
			(0.005)			(0.002)
R-squared	0.09	0.99	0.99	0.99	0.99	0.99
Observations	883	767	766	883	767	766
Hansen J-Test				0.001	0.001	0.001

All panel regressions include year and country fixed effects. Robust standard errors are reported in parentheses. All variables except the informal sector size are in natural logarithms. ***, **, * denote 1, 5, and 10% confidence levels, respectively.

Table 3: Systems Estimations

Dependent Variable	3SLS		OLS		GMM	
	IS	Tax	IS	Tax	IS	Tax
IS(-1)	0.51***		0.60***		0.62***	
	(0.20)		(0.15)		(0.15)	
Tax Burden	0.02**		0.01***		0.02**	
	(0.01)		(0.005)		(0.01)	
Public Trust	-0.004**	0.68***	-0.006***	0.67***	-0.004**	0.66***
	(0.002)	(0.20)	(0.003)	(0.002)	(0.001)	(0.19)
Risk Premium (r)	0.008**		0.009**		0.007*	
	(0.004)		(0.004)		(0.004)	
GDP per-capita	-0.007**		-0.01**		-0.009**	
	(0.003)		(0.005)		(0.004)	
R-squared	0.99	0.08	0.99	0.08	0.99	0.08
Observations	766	766	766	766	766	766

All variables except the informal sector size are in natural logarithms. All panel regressions include year and country fixed effects. Robust standard errors are reported in parentheses. ***, **, * denote 1, 5, and 10% confidence levels, respectively.