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A note on informality and public trust

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Abstract

Empirical evidence indicates that the level of informality is negatively correlated with the public trust in government. In this paper, we aim to account for this observation by constructing a model where government type cannot be directly observed by households. We characterize the Markov perfect equilibrium and show that public trust may account for the presence as well as persistence of informality.

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1 Introduction

The presence of a large informal sector in the developing economies constitutes a barrier for various economic outcomes for these countries including but not limited to growth, productivity, development and fiscal policy. Even though informality is a widespread phenomenon throughout the world (see Buehn and Schneider, 2012 or Elgin and Oztunali, 2012), many issues about its nature and consequences still remain largely under-explored. For example, the existing literature, has failed to generate a consensus around the measurement, determinants and effects of informality. Among several others, with the construction of recent estimates on peoples' perceptions of the government, one recent factor that is associated with informality is public trust in the government.

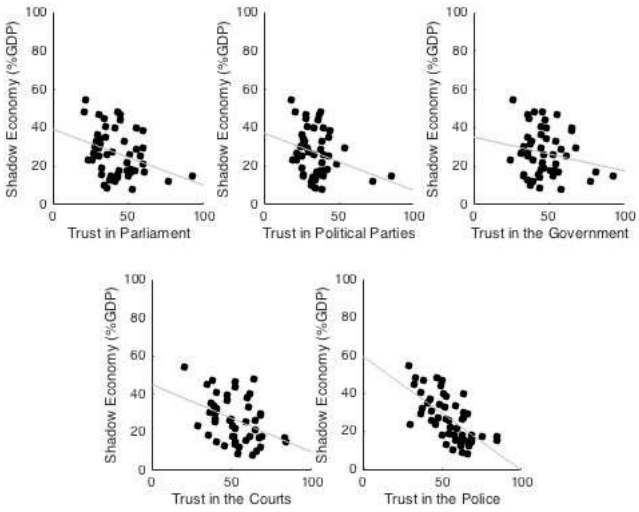
In this paper, we aim to account for the relationship between the size of the informal sector and public trust in the government by constructing a model where government type, that cannot be directly observed by households, follows a Markov chain. We characterize the Markov perfect equilibrium of the model, and show that public trust on the government may account for the presence as well as persistence of informality. Even if governments introduce a policy to encourage households to work in the formal sector to alleviate the problem arising from the high levels of informality, some households will believe that the aim of the government is to capture the tax revenue, and the goal of the policy is to increase the tax base. Therefore, the effectiveness of the policy depends on households' level of trust in their government to commit to the announced policy.

To model the link between trust in the government and the size of shadow economy, a setting can be designed in which the government chooses whether to commit to or deviate from an announced policy and households decide on amount of labor supplied to formal and informal sectors under the presence of informational asymmetry about the true type of government in power. Using a similar setting, D'Erasmo (2008) examines the link between government reputation and debt repayment several emerging economies. Chean and Lu (2013) provide an optimal tax policy that trustworthy government chooses in such an environment. Araujo and de Souza (2010) investigate workers' and firms' entry and exit decisions to formal and informal sectors and the effect of taxes by utilizing an evolutionary game theory approach. However, our paper is unique in the literature in modelling informality in a model with varying government reputation and thereby public trust.

Among several related papers, Dabla-Norris et al. (2008) show that the quality of legal framework is significantly associated with the size of informal sector. Using data from 69 countries, Friedman et al. (2000) show that informal activity is associated with government corruption. D'Hernoncourt and Méon (2012) report that both generalized trust and trust in institutions affect the size of shadow economy. Below we illustrate the above-mentioned relationship between public trust and informality that manifests itself as a strong negative correlation between shadow economy size and trust in several political and bureaucratic institutions. Trust measures for 50 countries, including both developing and developed countries, are obtained from the World Values Survey Wave 5. Trust indices are constructed based on survey results where participants are asked to report their level of confidence in the political parties, courts, the government, the police and the parliament in their countries. The data[1] for informal sector as % of GDP is from Elgin & Oztunali (2012).

[1]Using an alternative dataset of informality from Buehn and Schenider (2012) yield similar results.

Figure 1: Shadow Economy vs Trust



2 Model

We consider an economy consisting of a continuum of households and a government. Households are distributed uniformly over [0,1] interval. The government can be of two types, *trustworthy* or *opportunistic*, but this cannot be observed by the households. The households maximize utility, while the opportunistic government's goal is to maximize the tax revenue that it can use as office rent.

Trustworthy government does not tax output produced in either sector. Opportunistic government, on the other hand, can either commit to a zero-tax policy similar to the trustworthy government or deviate by taxing the formal output at a rate τ and the informal output at a rate $\phi\tau$, where $\phi < 1$ can be interpreted as the tax enforcement rate. The government's type follows a Markov process and therefore, can change at the beginning of each period. A trustworthy government is replaced by an opportunistic government with probability δ, and an opportunistic government may turn into a trustworthy one with probability ϵ. Each period, the households simultaneously decide whether to *trust* or *suspect*. A trusting household determines the amount of formal and informal labor supply assuming that the government will commit to the tax policy it announces, while a suspecting household chooses the labor supplied for each sector assuming that the government will deviate and impose a positive tax rate. The sectors differ in terms of the technology used in the process of production. The formal sector production function is of the form $y_F = \theta_F N_F$, where the informal sector's production function[2] is given by $y_I = \theta_I N_I^{\gamma}$, with $\gamma \in (0, 1)$. Informal and formal sectors are modeled to produce a homogeneous good. Here we abstract from variable capital input for the sake of simplicity. Labor supply is inelastic, and normalized to 1.

The fraction of trusting households at period t, μ_t, is observable by the government and the households, but households cannot affect it individually. After observing μ_t, government

[2]See Ihrig and Moe (2004) for the justification of a decreasing returns to scale production function in the informal sector.

moves. The trustworthy government commits to the announced tax policy; the opportunistic government, however, either commits or deviates. Note that once the government deviates, the households will be sure that they face an opportunistic government. Nevertheless, the next period's government will not necessarily be an opportunistic one, since there is a positive probability that the opportunistic government is replaced by a trustworthy government, ε. Each period, households choose the amount of labor supply for these two sectors. Trusting households choose the labor input for each sector that solves

$$\max_{N_F^t, N_I^t} \log(c^t)$$

subject to

$$c^t \leq \theta_F N_F^t + \theta_I (N_I^t)^\gamma,$$

and

$$N_F^t + N_I^t = 1.$$

Therefore, the optimal amount of informal labor for trusting households is given as:

$$\hat{N}_I^t = \left(\frac{\gamma \theta_I}{\theta_F} \right)^{\frac{1}{1-\gamma}}.$$

On the other hand, suspecting households determine the labor input for each sector that solves

$$\max_{N_F^o, N_I^o} \log(c^o)$$

subject to

$$c^o \leq (1-\tau)\theta_F N_F^o + (1-\phi\tau)\theta_I (N_I^o)^\gamma,$$
$$N_F^o + N_I^o = 1.$$

Hence, the optimal level of informal labor supplied to the informal sector for the suspecting households is

$$\hat{N}_I^o = \left(\frac{(1-\phi\tau)\gamma\theta_I}{(1-\tau)\theta_F} \right)^{\frac{1}{1-\gamma}}.$$

The households' actual utility depends on the government's decision on the tax level. If the government commits to the policy, the level of consumption for the trusting households will be

$$c^{tc} = \theta_F \hat{N}_F^t + \theta_I (\hat{N}_I^t)^\gamma,$$

and the suspecting household's consumption will be

$$c^{sc} = \theta_F \hat{N}_F^o + \theta_I (\hat{N}_I^o)^\gamma.$$

On the other hand, if the government deviates, the level of consumption for the trusting household will be

$$c^{td} = (1-\tau)\theta_F \hat{N}_F^t + (1-\phi\tau)\theta_I (\hat{N}_I^t)^\gamma,$$

and the consumption of suspecting household will be

$$c^{sd} = (1-\tau)\theta_F \hat{N}_F^o + (1-\phi\tau)\theta_I (\hat{N}_I^o)^\gamma.$$

3 Results

In the equilibrium, the opportunistic government makes the continuum of households indifferent between trusting and suspecting. Therefore, the opportunistic government's deviation probability, π^*, satisfies

$$(1-\pi^*)u(c^{tc}) + \pi^* u(c^{td}) = (1-\pi^*)u(c^{sc}) + \pi^* u(c^{sd})$$

Therefore,

$$\pi^* = \frac{u(c^{sc}) - u(c^{tc})}{u(c^{td}) + u(c^{sc}) - u(c^{tc}) - u(c^{sd})}$$

Let ρ denote the households' belief that the government is trustworthy. As shown by Phelan (2006), the cutoff posterior $\rho^* = 1 - \pi^*$, i.e.

$$\rho^* = \frac{u(c^{td}) - u(c^{sd})}{u(c^{td}) + u(c^{sc}) - u(c^{tc}) - u(c^{sd})}$$

If the government commits in period i when it was expected not to distribute it with probability π, Bayesian updating gives the probability of having a trustworthy government as

$$Pr(\text{t}|\text{c}) = \frac{\rho}{\rho + (1-\rho)(1-\pi)}$$

at the end of period i. It implies that the households' belief of having a trustworthy government at the beginning of period $i+1$ is

$$\rho'(\rho,\pi) = (1-\delta)\left[\frac{\rho}{\rho + (1-\rho)(1-\pi)}\right] + \varepsilon\left[1 - \frac{\rho}{\rho + (1-\rho)(1-\pi)}\right] \tag{1}$$

The government reputation should be characterized to find the equilibrium fraction of trusting households, $\hat{\mu}(\rho)$, while the opportunistic government follows $\hat{\pi}(\rho)$. If $\hat{\pi}(\rho) = \frac{\pi^*}{1-\rho}$, then

$$\rho'(\rho) = \left[\frac{\rho(1-\delta-\varepsilon)}{\rho^*}\right] + \varepsilon$$

Under this government reputation schedule, the opportunistic government commits for N periods, waiting for its reputation to exceed the cutoff level. In other words,

$$\rho_i < \rho^* \text{ for } i = 0, \ldots, N-1$$

$$\rho_N \geq \rho^*$$

Once we characterize N, we can construct the fraction of trusting households $\hat{\mu}_i$ to guarantee that the opportunistic government becomes indifferent between committing to and deviating from the zero-tax policy. For $i = 0, \ldots, N-1$,

$$\begin{aligned}
V_i &= \beta V_{i+1} \\
V_i &= \hat{\mu}_i(\tau\theta_F \hat{N}_F^t + \phi\tau\theta_I(\hat{N}_I^t)^\gamma) + (1-\hat{\mu}_i)(\tau\theta_F \hat{N}_F^o + \phi\tau\theta_I(\hat{N}_I^o)^\gamma) + \beta V_0 \\
V_N &= (\tau\theta_F \hat{N}_F^t + \phi\tau\theta_I(\hat{N}_I^t)^\gamma) + \beta V_0
\end{aligned}$$

where $\tilde{\beta}$ is the discount factor and $\beta = \tilde{\beta}(1-\varepsilon)$ is the effective discount factor for the opportunistic government. This system of equations has a unique solution for the households' play, $\hat{\mu}_i$, for $i = 0, \ldots, N-1$,

$$\hat{\mu}_i = \frac{\frac{(\phi\tau\theta_I(\hat{N}_I^t)^\gamma + \tau\theta_F\hat{N}_F^t)(\beta^{N-i} - \beta^{N+1})}{1-\beta^{N+1}} - (\phi\tau\theta_I(\hat{N}_I^o)^\gamma + \tau\theta_F\hat{N}_F^o)}{\phi\tau\theta_I((\hat{N}_I^t)^\gamma - (\hat{N}_I^o)^\gamma) + \tau\theta_F(\hat{N}_F^t - \hat{N}_F^o)}$$

The solution for $\hat{\mu}_i$ satisfies that $\hat{\mu}_N = 1$ as we assume. The informal labor supply after i periods following a deviation is given by

$$\Psi_i = \hat{\mu}_i\hat{N}_I^t + (1-\hat{\mu}_i)\hat{N}_I^o,$$

and the ratio of informal output to the total output in the economy in period i is

$$\xi_i = \frac{\hat{\mu}_i\theta_I(\hat{N}_I^t)^\gamma + (1-\hat{\mu}_i)\theta_I(\hat{N}_I^o)^\gamma}{\hat{\mu}_i(\theta_I(\hat{N}_I^t)^\gamma + \theta_F\hat{N}_F^t) + (1-\hat{\mu}_i)(\theta_I(\hat{N}_I^o)^\gamma + \theta_F\hat{N}_F^o)}.$$

Using the equilibrium strategies by the government and the households, a comparison between full commitment economy and the economy in-hand can be made regarding the level of informal labor and the amount of informal output as percentage of the formal output.

Proposition 1: In an economy described above, the amount of informal labor is at least as much as the one in a full commitment environment.

Proof. I f all governments compulsorily commit to the announced tax policy, all households will act trustingly. Therefore, the amount of informal labor will be

$$\hat{N}_I = \hat{N}_I^t = \left(\frac{\gamma\theta_I}{\theta_F}\right)^{\frac{1}{1-\gamma}}.$$

Since $0 \leq \phi < 1$, $\frac{1-\phi\tau}{1-\tau} > 1$, this will imply $\hat{N}_I < \hat{N}_I^o$. Since $0 < \mu_i \leq 1$ for $i = 0, \ldots, N$ with an equality for $i = N$, we have $\hat{N}_I \leq \mu_i\hat{N}_I^t + (1-\mu_i)\hat{N}_I^o$ with an equality for $i = N$. □

Proposition 2: In an economy described above, the ratio of informal output to the total output is at least as much as the one in a full-commitment environment.

Proof. As shown in the previous proof, the amount of informal labor in the full commitment case will be $\hat{N}_I = \hat{N}_I^t$. Suppose $\bar{\xi}$ denotes the ratio of informal output to the total output in the full commitment case. Then, since $\mu_i \in (0, 1]$ for all i,

$$\begin{aligned}
\xi_i \geq \bar{\xi} &\iff \frac{\theta_I(\hat{N}_I^t)^\gamma}{\theta_I(\hat{N}_I^t)^\gamma + \theta_F\hat{N}_F^t} \leq \frac{\theta_I(\hat{N}_I^o)^\gamma}{\theta_I(\hat{N}_I^o)^\gamma + \theta_F\hat{N}_F^o} \\
&\iff B^\gamma(\theta_I(\hat{N}_I^t)^\gamma + \theta_F(1-\hat{N}_I^t)) - \theta_I B^\gamma(\hat{N}_I^t)^\gamma - \theta_F(1-B\hat{N}_I^t) \geq 0 \\
&\iff \theta_F(B^\gamma - B^\gamma\hat{N}_I^t - 1 + B\hat{N}_I^t) \geq 0 \\
&\iff \theta_F((B^\gamma - 1) + \hat{N}_I^t(B - B^\gamma)) \geq 0
\end{aligned}$$

where $B \equiv \left(\frac{1-\phi\tau}{1-\tau}\right)^{\frac{1}{1-\gamma}} > 1$. □

These propositions show that differences in government reputation lead to the differences in the level of informality. Households in countries with lower trust in the government do not respond to the policy announcements the same way as the ones in the countries with highly trusted governments. In the presence of uncertainty about government commitment, the level of informality in terms of the labor supplied and the output produced remains at higher levels compared to the economies with a government that fully commits.

4 Conclusion

In this paper we show that public trust may account for the presence as well as persistence of an informal sector. We characterize the dynamics of the process of reputation formation of an opportunistic government, i.e. the type of government that doesn't necessarily commit to the plan that it announces, and argue that the persistence of the size of informal sector can be explained by examining this process. By using a model similar to the one of Phelan (2006), we find a Markov perfect equilibrium where an opportunistic government plays a mixed strategy, rather than always deviating, to build reputation among the households.

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