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Taxing the unobservable: The impact of the shadow economy on inflation and taxation

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Summary. — Because the shadow economy cannot be taxed, it erodes the tax base and reduces tax revenues, forcing governments to resort to other ways to finance their expenditures. Accordingly, a larger shadow economy should give governments an incentive to shift revenue sources from taxes to inflation, in line with the public finance motive of inflation. In this paper, we recall that point in a simple canonical model, then empirically test it in a sample of up to 153 developed and developing countries over the 1999–2007 period. In line with the model's prediction, we indeed observe a positive relation between inflation and the size of the shadow economy, and a negative relation between the tax burden and the size of the shadow economy. We find that both relations are conditional on central bank independence and on the exchange rate regime, implying that it is the strongest in institutional set-ups that constrain monetary policy the least. Both relations are present in the sub-sample of developed countries as well as the sub-sample of developing countries. Both relations survive several robustness checks, using various sets of control variables including the stock of debt, controlling for endogeneity, using alternative estimates of the shadow economy, and estimating the two relations as a system of equations. © 2016 Elsevier Ltd. All rights reserved.

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1. INTRODUCTION

Estimates of the size of the informal sector, or shadow economy, routinely exceed 40% in developing economies (Gërxhani, 2004b; La Porta & Shleifer, 2008; Schneider, 2005, 2007; Schneider & Enste, 2000). Those daunting figures imply that a large share of output can, by definition, simply not be taxed because it remains undeclared and unrecorded. Such an erosion of the tax base is a major challenge to government finance. As a result, governments have to find alternative revenue sources to finance public expenditures. Inflation is one such source. Governments coping with a large informal sector therefore face an incentive to shift revenue sources from taxes to inflation.

From a theoretical point of view, the notion that inflation can be used to tax the informal economy goes back at least to Canzoneri and Rogers (1990). Subsequently, Nicolini (1998), Cavalcanti and Villamil (2003), and Koreshkova (2006) applied the public finance motive of inflation put forward by Bailey (1956) and Phelps (1973) to argue that using inflation to finance public expenditures may be optimal in the presence of a large informal sector. Végh (1989), Roubini and Salai-i Martin (1995), and Blackburn and Powell (2011) use similar arguments in the case of imperfect tax collection. The common feature of these contributions is that they apply to inflation the optimal taxation principle, which implies that the marginal welfare cost of inflation and the marginal welfare cost of taxes should be set equal to maximize welfare. In the presence of positive public expenditures and of an informal sector, that policy rule implies a positive inflation rate. Furthermore, it implies that the inflation rate increases with the size of the shadow economy, while taxes decrease accordingly.

Surprisingly, whether governments adjust inflation and taxation to the size of the shadow economy has never been tested empirically. Admittedly, Nicolini (1998), Cavalcanti and Villamil (2003), and Koreshkova (2006) provide quantitative assessments of the relevance of the public finance argument. They calibrate their models and provide estimates of the optimal levels of inflation and taxes implied by a given size of the informal sector. Koreshkova (2006) can even replicate the inflation gap between the US and Peru by focusing on the difference in size of their shadow economies. However, quantitative estimates either rest on the comparison of two countries, like Koreshkova (2006), or are provided with no reference to real world examples, like Nicolini (1998) and Cavalcanti and Villamil (2003). Most of all, those estimates are purely normative. They describe what the relation between the size of the informal sector and the levels of inflation and taxes should be; they do not describe the actual relation between them. Because there is no reason to believe in principle that governments maximize welfare, actual policies are likely to depart from the optimum, and those estimates cannot be used to predict inflation and taxes.

Our paper aims at addressing this caveat by performing a systematic empirical test of the impact of the size of the informal sector on both inflation and taxes in a large sample of countries. More precisely, we test the hypothesis that the shadow economy should tilt government finance from taxes to

inflation. For this, we use a panel data set of up to 153 countries for 9 years (1999–2007), with several econometric techniques. By doing so, we provide quantitative estimates of the magnitude of the actual reaction of inflation and taxes to the size of the informal sector. We thus perform a positive analysis of the impact of the informal sector on inflation and taxes.

In line with our hypothesis, we find evidence that the shadow economy has significant and robust effects on both inflation and taxes, even after controlling for major macroeconomic variables. More precisely, we observe that inflation increases with the size of the shadow economy whereas taxation decreases with it. We then refine the analysis to show that both relations are conditional on central bank independence and on the exchange rate regime. We in particular observe that the relation is the strongest where central banks are not independent, and that it becomes insignificant when central bank independence becomes large enough. Similarly, we find that the relation is the strongest in flexible exchange rate regimes. We also provide evidence that the relations are causal.

Besides extending our understanding of the macroeconomic effects of the informal sector, these findings touch upon several more general strands of the literature. First, they supplement our knowledge of the relation between taxation and the shadow economy. Theoretical and empirical research, such as Ihrig and Moe (2004), Dabla-Norris, Gradstein, and Inchauste (2008), or Anderson (2012), commonly assumes and documents the fact that taxes drive firms out of the formal sector. The results of this paper imply that the reverse effect exists. Second, by showing that a larger shadow economy results in a reduction in taxation, the paper contributes to our knowledge of the political economy of taxation and the tax burden, such as Acemoglu (2005) or Acemoglu, Ticchi, and Vindigni (2011). Third, it contributes to the empirical research on the structural determinants of inflation and seigniorage, such as Edwards and Tabellini (1991), Cukierman, Edwards, and Tabellini (1992), or Aisen and Veiga (2008a, 2008b). That literature has documented a robust relation between political instability and inflation. One explanation of the relation provided by Cukierman et al. (1992) is that political instability gives governments an incentive to delay the reforms that would improve the efficiency of the tax system. Huang and Wei (2006) also relate inflation to the efficiency of the tax system in a model of endogenous monetary policy with time inconsistency. However, neither Cukierman et al. (1992) nor Huang and Wei (2006) provide evidence of a relation between the efficiency of the tax system and inflation. By filling this gap, we document the key relation on which their models rest.

To reach those results, the rest of the paper is organized as follows. The next section recalls the basic public finance argument relating inflation and taxes to the informal sector, using a simple but general model emphasizing that the relation does not rest on the assumption of a welfare-maximizing government. Section 3 describes the data and the econometric strategy we have used. Section 4 provides the baseline results, and section 5 takes them through a series of robustness checks. Section 6 concludes.

2. THE BASIC INCENTIVE

To describe the impact of the shadow economy on the government budget, let us consider a government that has to finance a given level of public spending G with two instruments, a flat tax on output with rate τ, and seigniorage. However, the shadow economy amounts to a share ϕ of total GDP.[1] As shadow output cannot be taxed, the output tax revenue is equal to $\tau(1 - \phi)Y$. If we denote Q the seigniorage revenue, then the government's budget constraint reads:

$$G = \tau(1 - \varphi)Y + Q \tag{1}$$

Variants of that budget constraint can be found in Cukierman et al. (1992), Edwards and Tabellini (1991), Cavalcanti and Villamil (2003), Koreshkova (2006), or Prado (2011). Their common feature is the assumption that the shadow economy erodes the tax base.

To model seigniorage, we now follow Mankiw (1987), and assume that the demand for money is described by the quantity equation:

$$\frac{M}{P} = kY \tag{2}$$

where M denotes outside money, P the price level, and k is a constant.

Rewritten in variations, the quantity equation implies:

$$\frac{\Delta M}{M} = \pi + g \tag{3}$$

where π stands for the inflation rate, and g for the growth rate of output.

From (2) and (3), the real revenue raised from seigniorage can then be rewritten as:

$$\frac{\Delta M}{P} = \frac{\Delta M}{M} \cdot \frac{M}{P} = (\pi + g)kY \tag{4}$$

We assume that the costs of taxes and inflation increase with the level of each, and that the marginal costs are also increasing. Note that we refer to the cost of financing the budget as opposed to deadweight or welfare losses so as to remain as general as possible. As Mankiw (1987) remarks, one would typically expect the marginal social cost of raising revenue to increase. However, the cost of taxes and inflation may also reflect the political and administrative cost of raising revenues. Here again, it is intuitive to assume that the marginal costs are increasing, for instance because raising taxes and inflation reduces the government's popularity and increases the probability that it will be overthrown or because they require increased monitoring and supervision. As a consequence, the loss associated with taxes is given by $f(\tau)Y$, with $f' > 0$ and $f'' > 0$. Similarly, the loss associated with inflation is given by $h(\pi)Y$, with $h' > 0$ and $h'' > 0$.

The government needs to finance expenses G, but wishes to minimize the total cost of financing them. Those costs may reflect welfare or political costs. As Barro (1979) points out that setup is consistent with a benevolent social planner, with a self-interested politician who is subject to effective control, or with a dictator who maximizes own utility. In that case, the dictator would minimize the cost to his regime of levying taxes and seigniorage. For the same reason, we do not specify the destination of public expenditures, which may finance a public good as well as the dictator's private consumption. Instead, we stress that the mechanism at work is more general than the one assumed by Nicolini (1998), Cavalcanti and Villamil (2003), or Koreshkova (2006), who all assume a benevolent social planner. What matters to the argument is that the loss the government perceives be increasing and convex in both the tax rate and inflation.

One should also note that the behavior that we assume may be inconsistent with a benevolent social planner in more refined versions of the model. For instance, Kimbrough